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VETERINARY MEDICINE

MARCH 1938

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VOL. XXXIII
No. 3

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VOL. XXXIII MARCH, 1938 No. 3

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H. J. Mostyn, 1265 Broadway, New York, Eastern Representative
Telephones: Chicago, South Shore 7160; Kansas City, Logan 4600; New York, Murray Hill 4-4037

A new pain-killing drug manufactured synthetically from coal oil, has been reported by Prof. Erich Mosettig of the University of Virginia.

* * * *

If glass stoppered bottles have "frozen", place a few drops of a mixture of equal parts of glycerine and water on the lip of the bottle so the solution can work down between the glass stopper and the bottle neck. After a few minutes, the glass stopper will, as a rule, come out easily. If it does not, heat the glycerine solution and make another attempt.

* * * *

With the exception of water, glycerine is the ingredient most used in modern medicine. In 1936, the United States produced 300 million pounds of glycerine and 11 million pounds were imported. This represents an increase of 23 million pounds, more than 20 freight train loads, over the amount used in 1935.

* * * *

Dressed poultry inspection service is conducted by the Bureau of Agricultural Economics of the U. S. Department of Agriculture, at approximately 30 places in Massachusetts, New York, New Jersey, Pennsylvania, Indiana, Illinois, Nebraska, Minnesota, Iowa and Washington. Live poultry inspection is carried on only at New York City and Newark, N. J.

Because a milk goat eats less than a cow, and produces enough milk for a small family, one scientist calls the goat "a handy pocket edition of the cow."—*S. N. L.*, 33:3.

* * * *

The Bankhead-Jones Act, recently enacted by the Congress, provides $75,000 for the establishment of three regional poultry disease research laboratories. The money is now available and it is expected the laboratories will be established by July 1st. After that date, $100,000 per year is provided for their maintenance. The personnel for each laboratory will include six research scientists.

* * * *

Dr. C. E. Cotton, State Veterinarian of Minnesota, compiled a report of the number of cases of equine encephalomyelitis occurring in Minnesota last season, from the reports of 270 veterinarians. The report shows that 41,159 cases occurred, of which 9,200 (22.35%) were fatal.

Dr. A. W. Uren of the University of Missouri, compiled a similar report for Missouri, from the reports of county agents, and finds that the number of cases exceeded 1,000.

Question: Is equine infectious encephalomyelitis a veterinary problem in Minnesota and a county agent problem in Missouri?

Prior to 1922, the U. S. Public Health Service had done no work relating to milk sanitation except to make some epidemiological studies of milk-borne epidemics. But in 1922, the Service became concerned with the low per capita consumption of milk in the United States and appointed Mr. Leslie C. Frank to make a study of the situation. Mr. Frank began his work with the idea of increasing the consumption of milk and made certain surveys to see what could be done. He collected milk control ordinances from various sections of the country and found them to be widely dissimilar in their requirements. Investigating conditions of milk production, Mr. Frank found the quality of market milk in general so poor that he became intensely interested in improving the quality of milk before he could conscientiously advocate its increased consumption.—*Milk Sanitarian.*

* * * *

Hodes, Lavin and Webster of the Rockefeller Institute for Medical Research, announce that as a result of experiments, there is promise of producing a vaccine against rabies in which the virus is attenuated by ultra violet light. Such a vaccine has been made and tested on mice with promising results.

German Police Dog With Prolapse of the Rectum.

Operation: Flank colopexy (attachment of the lower colon to an abdominal incision in the flank).
Anesthetic: Ether (delivered through a tube introduced into the trachea).
Surgeon: Dr. Carl F. Schlotthauer, Mayo Foundation, Rochester, Minn.
Assistants: Dr. O. F. Reihart, Omaha, Nebr., (facing front) and Dr. A. J. Steiner, Lexington, Ky., (standing behind Doctor Schlotthauer).—*Clinic of the American Veterinary Medical Association, Omaha, 1937.*

A long list of court terminations reported recently by the Federal Food and Drug Administration includes the Litchfield Produce Co., Litchfield, Minn., for shipping interstate diseased and decomposed dressed poultry, fine $100; Eby Remedy Company, Marengo, Iowa, for shipping interstate Eby's Swine Medicine, fine $25 and costs, and Lawrence-Williams Co., Cleveland, Ohio, for shipping interstate Lawrence's Caustic Balsam for ailments of horses and cows, fine $200 and costs.

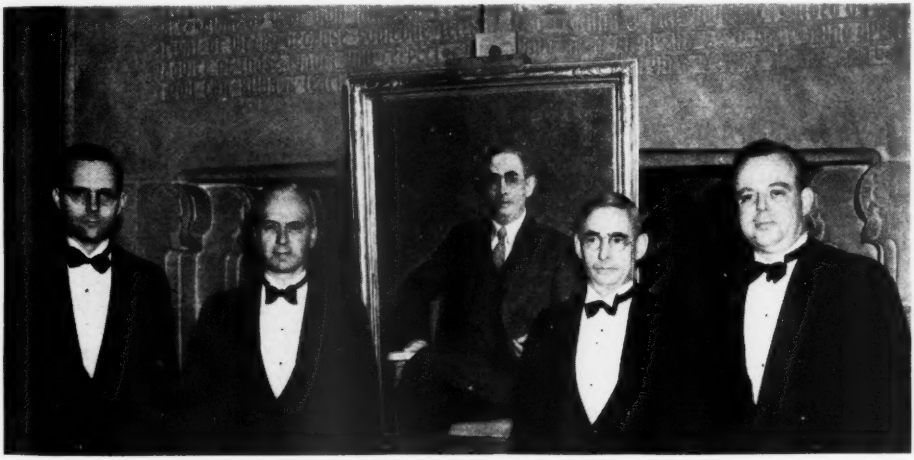
Meat Inspection of Poultry

Official poultry meat inspection began in New York City in 1928. Since then other cities have taken up the work and during 1935 there were 23,268,441 pounds of poultry inspected under the supervision of the Bureau of Agricultural Economics of the U. S. Department of Agriculture. Of this amount more than one-half million pounds were condemned as unfit for food. The causes for condemnation were tuberculosis, septicemia, emaciation, decomposition, peritonitis, tumors, leucemia, abscesses, etc.

Periodicity of Diseases

The factors which govern the onset and course of an epizoötic are: (1) The dosage of the infection; (2) the virulence of the infecting organism, and (3) the resistance of the host mass (not of the individual host). As these factors change constantly, epizoötics pursue a rhythmic course; i. e., they occur in waves of greater and lesser incidence and of varying mortality.

Although the virus molecules are now well established as non-living things, possessed of certain very lifelike characteristics, it is not necessary to look upon them as the lowest beginnings of what might possibly turn into life—as a sort of pre-living or proto-living condition of matter. They



The outstanding feature of the banquet at the 30th annual Cornell Conference for Veterinarians at the New York State Veterinary College, January 6-7, 1938, was the presentation to Cornell University of the Alumni Portrait of Dr. Dennie Hammond Udall. The portrait was accepted by Pres. Edmund E. Day of the University. Those shown in the illustration, are, left to right: Dr. M. G. Fincher, Assistant Professor of Veterinary Medicine, New York State Veterinary College and President of the New York State Veterinary College Alumni Association. Dr. Edmund E. Day, President of Cornell University. Dr. Dennie H. Udall, Professor of Veterinary Medicine, and Dr. William A. Hagan, Dean, New York State Veterinary College.

The conference was attended by more than 300 veterinarians. The plan followed being two hours of clinical or laboratory demonstrations and two hours of general meetings in the forenoon, and two sectional meetings during the afternoon. Visiting speakers included: R. E. Shope, Rockefeller Institute, Princeton, N. J.; Frank Breed, Norden Laboratories, Lincoln, Nebr.; R. A. McIntosh, Ontario Veterinary College, Guelph; A. M. Mills, Plainsboro, N. J.; J. R. Varley, New Brunswick, N. J.; C. N. Bramer, Evanston, Ill., and A. F. Coca, Pearl River, N. Y.

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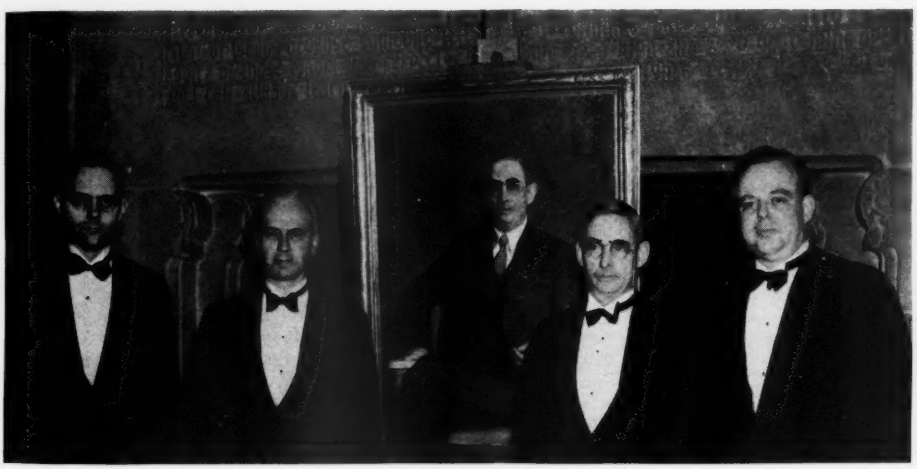

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XIII International Veterinary Congress

Zurich-Interlaken, Switzerland, Aug. 21-28, 1938

General Sessions

I.

1. **Veterinary Education under modern requirements.** Prof. Dr. E. Leclainche, Director of the International Bureau of Epizoötics, Paris, France.

2. **The importance of the veterinarian in animal husbandry and in the production of food products of animal origin.** Prof. Dr. V. Stang, Director of the Zoötechnical Institute, University of Berlin, Germany.

II.

General conditions in the origin and development of infectious diseases. Prof. Dr. W. Frei, Institute of Veterinary Pathology, University of Zurich, Switzerland; Dr. P. J. Du Toit, Director of Veterinary Services, Department of Agriculture, Onderstepoort, Pretoria, Union of South Africa.

III.

Disturbances in animal reproduction. Prof. Dr. R. Götze, Director Obstetrical and Medical Clinic, Veterinary College, Hannover, Germany; Prof. Dr. N. Lagerlöf, Veterinary College, Stockholm, Sweden.

Sectional Meetings

Section I: Internal Medicine and Surgery

1. *Recent progresses in haematology of animal diseases.*—Capt. J. R. Barker, MRCVS, DVH., St. Peter Square, Hereford, England; Prof. Dr. A. Hjärre, Veterinary College, Stockholm, and H. Berthelsen, Veterinary College, Stockholm, Sweden; Prof. Dr. D. Wirth, Professor of Veterinary Medicine, Veterinary College, Vienna, Austria.

2. *Recent researches regarding the influence of feeding on the development of diseases.*—Prof. Dr. F. Zaribnicky, Veterinary College, Vienna, Austria; Prof. Dr. B. Carlström, Veterinary College, Stockholm, Sweden; Dr. St. Angeloff, Director of the State Institute for Veterinary Bacteriology, Sofia, Bulgaria, and Dr. Zw. Thomoff, Faculty of Veterinary Medicine, Sofia, Bulgaria.

3. *X-ray Diagnosis.*—Dr. A. Pommer, Lecturer and director of the institute for X-rays at the medical clinic, Veterinary College, Vienna, Austria; Col. Dr. J. Kulczycki, Lecturer, Veterinary Faculty, University of Warsaw, Poland; Dr. Gerry B. Schnelle, Angel Memorial Animal Hospital, Boston, Mass., U. S. A.

4. *The present status of anaesthesia.*—Prof. Dr. A. Klarenbeek, University of Utrecht, Utrecht, Netherlands, and Prof. Dr. J. H. Hartog, Director of the Veterinary Clinic for internal diseases, University of Utrecht, Netherlands; Prof. J. G. Wright, FRCVS., Royal Veterinary College, Camden Town, London, England; Dr. F. Benesch, Professor of Obstetrics, Veterinary College, Vienna, Austria; Capt. Dr. Shunsei Kimata, Military Attaché, Japanese Embassy, Berlin, Germany.

Section II: Infectious Diseases

1. *The value of tuberculin testing in the control of tuberculosis.*—Dr. J. R. Mohler, Chief of the Bureau of Animal Industry, Department of Agriculture, Washington, D. C., U. S. A.; Dr. N. Plum, Chief State Veterinary-serological Laboratory, Copenhagen, Denmark; Dr. H. Zeller, Ministerial Councilor, State Department of Health, Berlin-Dahlem, Germany; R. E. Glover, MA., BSc., FRCVS., Superintendent, Medical Research Council, Farm Laboratories, Mill Hill, London, England; P. J. 't Hooft, State Veterinary Service, The Hague, Netherlands, and Dr. A. H. Veenbaas, Veterinary Health Department of the Province of Friesland, Leeuwarden, Netherlands; Prof. Dr. G. Finzi, Dean of the Faculty of Veterinary Medicine, Milan, Italy.

2. *Aujeszky Disease (pseudorabies).* — Dr. Bailly, Pasteur Institute of Morocco, Tangier, Morocco; Dr. I. Koeves, Lecturer, President of the Hungarian Veterinary Association, Budapest, Hungary.

3. *Swine Influenza.*—Dr. J. P. Scott, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, U. S. A.; Prof. Dr. O. Waldmann, Insel Riems, Griefswald, Germany; R. Willems, Director of the Laboratory of State Veterinary Inspection, Brussels-Cureghem, Belgium.

4. *Control of "Salmonellosis" in animals.*—Prof. Dr. R. Manninger, Royal Hungarian Veterinary College, Budapest, Hungary; Prof. Dr. J. Verge, National Veterinary School of Alfort, Seine, France; Prof. Dr. H. Miessner, Director of the Hygienic Institute, Veterinary College of Hannover, Germany; Dr. Seiichi Fujimura, Imperial Institute for Infectious Animal Diseases, Nishigahara, Tokyo, Japan.

Section III: Cattle Diseases

1. *Malignant Catarrhal fever and similar diseases.*—Dr. M. Rinjard, National Research Laboratory of the Alfort Veterinary Services, Alfort, Seine, France; Dr. P. J. Du Toit, Director of Veterinary Services, Department of Agriculture and Forestry, Onderstepoort, Pretoria, Union of South Africa, and Dr. R. A. Alexander, Veterinary Services, Department of Agriculture and Forestry, Onderstepoort, Pretoria, Union of South Africa; Prof. Dr. E. Wyssmann, Veteri-

nary Faculty, University of Berne, Switzerland.

2. *Leukosis of cattle and other domestic animals.*—Prof. Dr. Dobberstein, Veterinary Pathological Institute, University of Berlin, Germany, and Prof. Dr. O. Seifried, Director of the Veterinary Pathological Institute, University of Munich, Germany.

3. *Newer researches on specific infections of the reproductive organs of cattle.*—Prof. P. Stazzi, Veterinary College, Milan, Italy; Prof. Dr. H. Holth, Director of the Royal Veterinary Institute, Oslo, Norway; Prof. Dr. L. Riedmüller, Institute for Veterinary Pathology, University of Zurich, Switzerland.

4. *Surgical demonstrations.*—Prof. Dr. R. Götze, Director of the clinic for obstetrics, Veterinary College, Hannover, Germany; Dr. T. H. Ferguson, Lake Geneva, Wisconsin, U. S. A.; Moltzen-Nielsen, Chief Veterinary Surgeon, Hospital of Animals, Copenhagen, Denmark.

Section IV: Parasitology and Parasitic Diseases

1. *Parasites of wild animals.*—Prof. M. Christiansen, Director of the Royal Veterinary and Serological Laboratory, Copenhagen, Denmark; Prof. Dr. A. Henry, National Veterinary School of Alfort, Seine, France; Professor T. W. M. Cameron, Director Parasitological Institute, Mac Donald College, McGill University, Montreal, Canada.

2. *The relation between parasitic diseases of man and animals.*—Dr. M. C. Hall, Chief, Division of Zoology, United States Public Health Service, Treasury Department, Washington, D. C., U. S. A.; Prof. Dr. F. Král, Veterinary College, Brno, Czechoslovakia.

3. *Pasture hygiene with respect to parasitic diseases.*—Dr. H. O. Mönnig, Veterinary Services, Department of Agriculture and Forestry, Onderstepoort, Pretoria, Union of South Africa; E. L. Taylor, MVSc., MRCVS., DVH., Ministry of Agriculture and Fisheries, Veterinary Laboratory, Weybridge, England; Dr. K. Kondić, Chief Veterinary Service, Ministry of Agriculture, Beograd, Yugoslavia.

4. *Immunity and immunity reactions in parasitic diseases.*—Prof. Dr. A. Kotlán, Royal Hungarian Veterinary College, Budapest, Hungary; Prof. Dr. Irene Maternowska, Head of the laboratory City abattoirs, Warsaw, Poland; Dr. F. Schoenaers, State School of Veterinary Medicine, Cureghem-Brussels, Belgium.

5. *New researches on some helminthic diseases of India.*—Capt. S. C. A. Datta, BSc., MRCVS., Veterinary Research Officer, Mukteswar-Kumaun, U. P. India.

Section V: Tropical Diseases

1. *Recent research regarding tropical and subtropical diseases.*—Dr. G. De Kock, Veterinary Services, Department of Agriculture and Forestry, Onderstepoort, Pretoria, Union of South Africa; R. Daubney, MSc., MRCVS., Director of Veterinary P. O. Services, Kabete, Kenya Colony, East Africa; Prof. M. Carpano, 131, Boulevard Mussolini, Tirana, Albania; Lt.-Col. R. A. Kelser, V.C., U. S. Army, Member, Army Medical Research Board, Ancon (Canal Zone), U. S. A.; Dr. A. Donatien, Chief of Laboratory, Pasteur Institute of Algeria, Algiers, and F. Lestoquard, Pasteur Institute of Algeria, Algiers; Dr. E. Dschunkowsky, Veterinarian, Beograd, Yugoslavia.

2. *Geographical distribution of tropical diseases.*—Dr. Curasson, General Inspector of Veterinary Services, Dakar, Senegal.

Section VI: Poultry Diseases

1. *Lymphomatosis.*—Prof. T. Dalling, MA., MRCVS., Director, Institute of Animal Pathology, Field Laboratories, Cambridge, England; Dr. E. L. Stubbs, Professor of Veterinary Pathology, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, U. S. A.; Prof. Dr. A. Braga, Institute of Animal Biology, Rio de Janeiro, Brazil.

Dr. Jose Figueroa, Director of Veterinary Service, San Jacinta, D. F. Mexico. Mexican representative on the Permanent Committee of the International Veterinary Congresses. Readers will recall an article by Doctor Figueroa in the June 1937 issue of Veterinary Medicine (page 274).

2. *Blackhead.*—Prof. P. Bardelli, Director of the Institute for Prophylaxis against Animal Infectious Diseases, Padua, Italy, and Prof. Menzani, Assistant of the Institute for Prophylaxis against Animal Infectious Diseases, Padua, Italy; Prof. Dr. R. Wetzel, Director of the Veterinary Parasitological and Zoological Institute, University of Berlin, Germany, and Dr. Enigk, Assistant of the Veterinary Parasitological and Zoological Institute, University of Berlin, Germany.

3. *Coccidiosis.*—Prof. Al. Vechiu, Faculty of Veterinary Medicine, University of Bucharest, Roumania.

4. *Psittacosis.*—Prof. Dr. Fortner, State Department of Health, Berlin-Dahlem, Germany; Dr. F. Gerlach, Director of the Federal Institute for Combating of Animal Diseases, Mödling near Vienna, Austria; Prof. Dr. L. Panisset, Infectious Diseases Research Laboratory, National Veterinary School of Alfort, Seine, France.

Section VII: Zoötechnics

1. *Growth and early maturity.*—Dr. G. H. Hart, University of California, College of Agriculture, Division of Animal Husbandry, Davis, California, U. S. A.

2. *Constitution of domestic animals from the anatomical, physiological and hygienic point of view and its relation to working capacity.*—Prof. Dr. J. U. Duerst, Faculty of Veterinary Medicine, University of Berne, Switzerland; Prof. J. Jespersen, Royal Veterinary and Agricultural College, Copenhagen, Denmark; Prof. Dr. J. Bečka, Veterinary College, Brno, Czechoslovakia.

3. *Influence of climate on the constitution, power of resistance and working capacity of domestic animals. Acclimatization.*—Dr. N. Teodoreanu, Director of the Laboratory of Zoötechnical Researches, Faculty of Veterinary Medicine, Palas-Constantza, Roumania; J. H. R. Bisschop, Veterinary Services, Department of Agriculture and Forestry, Onderstepoort, Pretoria, Union of South Africa; Dr. F. Stenčl, Lecturer at the Veterinary College, Brno, Czechoslovakia; Prof. Dr. E. Letard, National Veterinary School of Alfort, Seine, France.

4. *Law project on husbandry and herd hygiene for South American states on the Pacific Coast.*—Prof. Dr. H. K. Sievers Wicke, Director of the Veterinary Research Institute, Ministry of Agriculture, Santiago, Chile.

5. *Artificial insemination.*—Prof. Dr. Küst, Director of the Veterinary Ambulatory and Obstetrical Clinic, University of Giessen, Germany; Prof. Dr. T. Olbrycht, Director of the Zoötechnical Institute, Veterinary College, Lwów, Poland.

Section VIII: Meat Inspection and Milk Hygiene

1. *The inspection of tuberculous animals for slaughter.*—Prof. Dr. Nieberle, Director of the Veterinary Pathological Institute, University of Leipzig, Germany; Dr. M. Césari, Chief Veterinary Service, Pasteur Institute, Paris, France; Prof. Dr. C. F. van Oyen, Veterinary Faculty, State University of Utrecht, Netherlands.

2. *Bacterial and non-bacterial, physical and chemical changes in meat.*—Prof. E. Valenti, Director of the Bacteriological Laboratory, Milan, Italy; Prof. Dr. A. Trawinski, Veterinary College, Lwów, Poland.

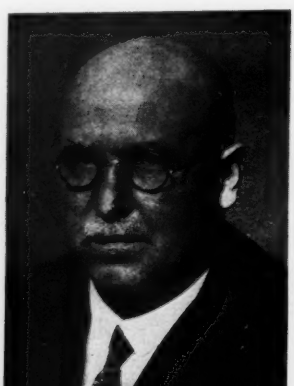
3. *Estimate of the value of milk from a hygienic point of view.*—Prof. L. Grassi, General Veterinary Inspector, Ministry of the Interior, Rome, Italy; Prof. H. C. Bendixen, Royal Veterinary and Agricultural College, Copenhagen, Denmark; Dr. Ward Giltner, Dean, Division of Veterinary Science, Michigan State College, East Lansing, Michigan, U. S. A.; Maj. Brennan de Vine, FRCVS., DVSM., Chief Veterinary Officer, City of Birmingham Veterinary and Food Inspection Department, Birmingham, England.

4. *Modern methods of stunning slaughter-animals.*—Prof. Dr. J. Roos, Director of the Institute for Veterinary Physiology, State University of Utrecht, Netherlands; Prof. Dr. O. Pecego, Veterinary College, Sao Paulo, Brazil.

Section IX: Military Veterinary Organization

1. *Protection against gas and therapy of gas injury of animals.*—Prof. Dr. Magne, Agronomical Institute, Paris, France, and Dr. D. Cordier, Lecturer at the National Veterinary Schools, France; Prof. Dr. Richters, Chief of the Veterinary Research Institute of the Army, Berlin, Germany.

2. *Prevention of animal diseases under wartime conditions.*—Col. A. G. Todd, CBE., DSO.,



Left to right: Prof. Dr. L. Panisset, reporter for France on "Psittacosis;" Prof. Dr. H. Miessner, reported for Germany on the "Control of Salmonellosis in Animals," and Dr. Franz Benesch, reporter for Austria on "The Present Status of Anesthesia."

MRCVS., Fleet, Hants, England, and Lt.-Col. J. J. M. Soutar, OBE., MRCVS., London, England; Prof. Dr. P. Perrucci, Ex-Chief Army Veterinary Service, Taranto, Italy; Lt.-Col. S. Barbosa, Chief, Veterinary Service of the Army, Rio de Janeiro, Brazil.

Section X: Veterinary Physiology

1. *Physiological fundamental principles for the feeding of domestic animals.*—Prof. Dr. O. Wellmann, Royal Hungarian Veterinary College, Budapest, Hungary; Prof. Dr. B. Sjollema, Laboratory for Veterinary Chemistry, State University of Utrecht, Netherlands; Dr. J. I. Quin, Veterinary Services, Department of Agriculture and Forestry, Onderstepoort, Pretoria, Union of South Africa.

2. *Physiology of the udder.*—Prof. Dr. H. Simonnet, National Veterinary School of Alfort, Seine, France; Dr. J. Grim, Czechoslovakia, and Prof. Dr. T. Vaček, Veterinary College, Brno, Czechoslovakia; Prof. G. Nichita, Faculty of Veterinary Medicine, Bucharest, Roumania.

3. *Newer researches into the physiology of the first stomach of ruminants.*—Dr. A. F. Schalk, Professor of Veterinary Preventive Medicine, The Ohio State University, Columbus, Ohio, U. S. A.; Prof. Dr. J. Wester, Veterinary Faculty, State University of Utrecht, Netherlands; Dr. E. Sym, Veterinary Faculty, University of Warsaw, Poland.

4. *Newer researches into the physiology of heredity.*—Prof. K. Eriksson, Zoötechnical Institute, Veterinary College, Stockholm, Sweden.

5. *Influence of gonadotropic hormones on the sexual apparatus of domestic animals.*—Prof. Dr. F. C. van der Kaay, Director of the Veterinary Obstetrical Clinic, State University of Utrecht, Netherlands.

Place of Meeting

The discussions of the Congress will take place in the Eidgenossische Technische Hochschule (E.T.H.) (Federal Technical College) in Zurich from Sunday, August 21 to Thursday, August 25. The second part of the Congress will be held at Interlaken on August 26 and 27.

The Opening Meeting is fixed for Sunday, August 21, at 4 p. m., in the Auditorium Maximum of the E.T.H. The opening address by the President of the Congress will be followed by brief addresses of welcome by the Administrative Authorities and by Delegates of the Foreign Governments.

More detailed information as to division of time in regard to the general and sectional meetings in Zurich from August 21 to 25 will be published in the official program in the spring of 1938.

The removal of the Congress to Interlaken, where on August 26 and 27 the second part of the program will be carried out, will be on Friday, August 26. From Interlaken, opportunity is offered for shorter excursions into the Bernese Oberland (Jungfraujoch, Mürren, Grindelwald, etc.). There begin also several-day excursions to the various districts of Switzerland interesting to tourists. Trips are contemplated to Zermatt (Gornergrat), to Lake Geneva (Montreaux and Lausanne), to Geneva, to Central Switzerland (Lake Lucerne and Lucerne), to the Engadine (St. Moritz), to the Tessin (Lugano and Locarno), etc.

Should participation be sufficient, it is proposed, during the days from August 18 to 21,—even before the Congress begins,—to organize excursions from Zurich for the members of the Congress.

On Wednesday, August 24, there will be no meetings in the afternoon, as excursions in common will be taken in the vicinity of Zurich.

Particulars regarding the excursions will be given in the Official Program.

Social Functions

Zurich:

Sunday, August 21: Evening reception in the University.

Tuesday, August 23: Official Banquet for the members of the Congress.

Wednesday, August 24, Afternoon: Excursions in the vicinity of Zurich.

Interlaken:

Friday, August 26, Afternoon: Welcome at the William Tell Open-Air Theatre. Evening: Banquet for the Official Delegates.

Saturday, August 27: Evening entertainment at the Kursaal, Interlaken.

The Ladies' Committee will arrange special excursions and sight-seeing tours, in Zurich and environs, for the ladies of members during the days of the Congress.

The students of the faculties of veterinary medicine of the Universities of Zurich and of Berne have appointed a committee to receive the students from foreign countries, for the purpose of making their stay agreeable and of being helpful in every way possible.

The Congress members will be given a card entitling them to use the tramways of the town of Zurich free of charge. Free tickets to the Swiss National Museum and the Zoological Gardens of Zurich are also placed at the disposal of the members of the Congress. At Interlaken the members will have free admission to the Kursaal.

Exhibitions

An Exhibition showing the development of veterinary medicine, especially as applied to Switzerland, will take place.

Furthermore, manufacturers of veterinary medicaments, apparatus and instruments, are given the opportunity of exhibiting their products in a special room

In addition, books published in the various countries along the line of veterinary medicine will be shown.

may even represent the last stages in the reverse process; may be the ultimate degeneration of life.—*S. N. L.*, 33:3.

Florida Will Raise Ticks

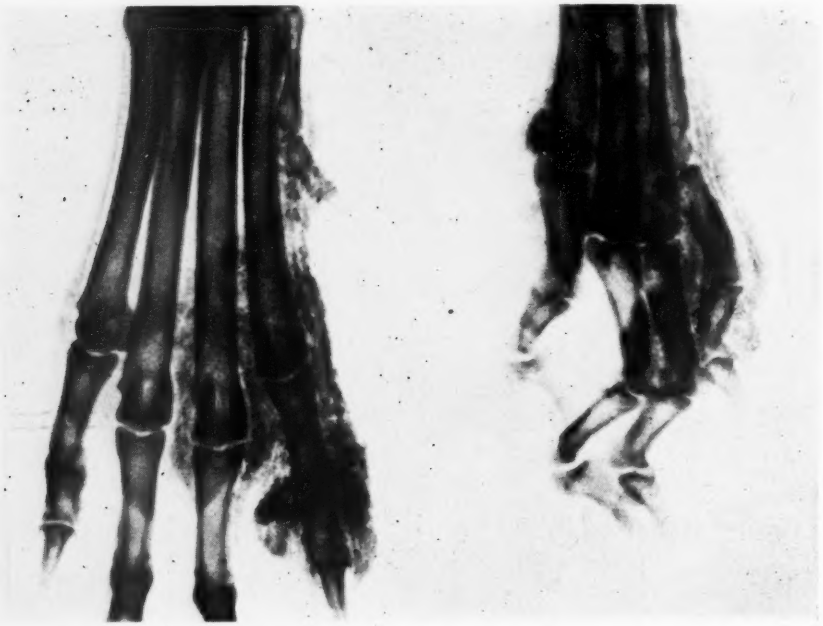
They have a new, polite name for damphools down in Florida. They call them "sportsmen." Because of their influence Florida will continue to rear scrawny cattle and scrawny deer, and line-bred, well-fed, high-producing cattle ticks.

A little more than a year ago, the live stock sanitary authorities of Florida had succeeded, after a generation of effort, in eradicating the fever tick from all parts of the state except three or four counties in which there are many swamps. They were unable to make progress against the tick in this area, because it also infests the wild deer which can not be dipped. Going before the legislature at its last session, they succeeded in getting authorization to eradicate the deer from these swamps on the agreement to restock the area with deer after the ticks were destroyed. They pointed out that the ticks were harmful to the deer as well as to the cattle, and that after the area was cleared of ticks and restocked with deer, it would be a far better haven for these animals than heretofore.

This new law was successfully attacked in the courts by persons preferring a few scrawny deer now to a more plentiful supply of larger thriftier deer a few years hence—and to hell with the cattle.

As a result, Georgia and Alabama will permit no Florida cattle to enter them without dipping. The first effect of the court ruling was to prevent more than 300 head of purebred show cattle from other states being shipped to the Florida State Fair last month.

Florida has the option of raising ticks *or* cattle; not both in the same area.



Two views of a forepaw of a Greyhound, 12 months of age. The history of the case is unique. The owner does not know of any injury to the foot, nor was anything abnormal noted until 14 days before the radiograph was taken, at which time the foot had been markedly swollen for only three days. Naturally, if the shadows along the bones indicate calcium deposits, one would suspect the condition to be several weeks, or months, or even longer in developing. The history definitely opposes this explanation. No enbrocations or ointments of any kind had been applied. I should appreciate suggestions as to the diagnosis and proper treatment.—*W. M. Nielsen, 67 Hall St., Cessnock, N. S. W., Australia.*

Join the XIII International Veterinary Congress

The National Committee of the XIII International Veterinary Congress is eager to obtain a creditable number of memberships from the veterinary profession in the United States. Dr. H. P. Hoskins, secretary of this committee, will approach the profession with that in view. The subscription fee is $7.50. Each member will receive the complete proceedings of the Congress and those who attend will also participate in the functions being arranged. The National Committee urges veterinarians to subscribe to the coming International Veterinary Congress. Send your application for membership to Dr. H. P. Hoskins, 221 N. La Salle St., Chicago, *now*.

Last month, we stated there would be two conducted tours of American veterinarians to the XIII International Veterinary Congress. It develops that that was an understatement. There will be three tours, as follows:

Doctor Cameron's Tour

Under the management of Thos. Cook & Son, Montreal, Canada, this tour includes in its itinerary six foreign countries and 10 cities. It requires 45 days, August 5th to September 18th; leaving from and returning to Montreal. The total distance traveled from Montreal to Montreal is 8,160 miles. Price, $495.00—six cents per mile.

The director of this party is Dr. T. W. M. Cameron, of the Institute of Parasitology, McGill University. He has a wide knowledge of the European countries and the places most likely to be of interest to veterinarians.

The countries visited include: England, Switzerland, Germany, Belgium, France and Scotland, and the cities, London, Zurich, Interlaken, Wiesbaden, Cologne, Brussels, Paris, Windemere, Edinburg and Glasgow.

Doctor Campbell's Tour

Under the management of Thos. Cook & Son, 16 N. Michigan Ave., Chicago, this tour includes in its itinerary 14 countries and 23 cities and comprises 55 days, July 23rd to September 15th. It will leave from Montreal and return to New York, traversing a distance of 12,238 miles, exclusive of sight-seeing travel during stops. The price (including all necessary expenses except the cost of passports and certain taxes) is $614.00—five cents per mile.

The director of this party is Dr. D. M. Campbell of Chicago, who has had extensive experience in conducting all expense tours.

The countries visited include Canada, Scotland, England, Denmark, Germany, Holland, Belgium, France, Switzerland, Italy, Yugoslavia, Greece, Algiers and Portugal, and in addition Sicily, Gibraltar and the Azores are touched upon.

The cities visited include: Montreal, Glasgow, Stirling, Edinburgh, London, Copenhagen, Berlin, Hanover, Amsterdam, Brussels, Paris, Zurich, Interlaken, Milan, Trieste, Ragusa, Patras, Naples, Palermo, Algiers, Gibraltar, Lisbon and Ponta del Gada.

Doctor Eichhorn's Tour

Under the management of Treasure Tours, Inc., 24 West 40th St., New York City, this tour includes in its itinerary 10 foreign countries and 18 cities. It requires 65 days, July 13th to September 15th; leaving from and returning to New York. The total distance traveled from New York to New York is 10,367 miles exclusive of sightseeing travel during stops. The price (including all necessary expenses, except the cost of passports and certain taxes) is $794.00—7.6 cents per mile.

The director is Dr. Adolph Eichhorn, Pearl River, N. Y., who directed the American veterinary tours in both 1914 and 1930, and who has conducted other organized tours of Europe.

The countries visited include England, Belgium, Holland, Germany, Hungary, Austria, Italy, Switzerland and France, and the cities Southampton, London, Brussels, Scheveningen, Berlin, Leipzig, Dresden, Munich, Budapest, Vienna, Venice, Milan, Zurich, Interlaken, Geneva, Grenoble, Nice and Paris.

The tours are not exactly comparable for the reason that, on Doctor Cameron's tour, on only two half-days and two whole days are scheduled sightseeing trips provided. All other days during the stops members of the party will be "on their own" as to expense of visiting places of interest, while, except for the Congress, Doctor Eichhorn's tour provides scheduled sightseeing, including the cost of transportation and admission, on all but nine half-days and seven whole days; and Doctor Campbell's tour includes this expense for all but two half-days and one whole day.

The cost of passports is $10.00; of taxes, about $6.40. A man, his wife and minor children may travel on a single passport.

Doctor Campbell's and Doctor Eichhorn's tours are both denominated "official tours." Doctor Cameron does not call his tour an official tour, although he would be within his rights in so doing; since Thos. Cook & Son is *the* official tourist agency for the Congress.

Study of the Sinuses of the Dog

By H. G. WIXOM, K.S.C. '38,
Manhattan, Kansas

THERE are two air sinuses in the head of the dog: the maxillary and frontal. It is important that the veterinarian be familiar with the shape, extent, and position of the head sinuses of the dog because of their clinical significance.

In this study several heads of dogs were secured from the postmortem room of the Kansas State College and dissected to study the sinuses. One head of a mongrel dog weighing about 25 pounds with the mandible removed, was divided as nearly as possible in the midline, and No. 7½ lead shot was poured into each sinus; into the frontal sinus through a trephined opening in the middle of the frontal bone, and into the maxillary sinus through its nasal opening. The head was radiographed to show the outline of each sinus. The illustration is from this radiograph.

SISSON describes the maxillary sinus as a recess of the nasal cavity rather than a true sinus. In the skull this is no doubt true, but in the living animal the maxillary sinus is almost a closed cavity communicating only in its lower part with the nasal cavity through a narrow, slit-like opening. This sinus as shown in the illustration is somewhat "fat" crescent-shaped in lateral outline and elliptical in dorso-ventral outline (not shown). The length is shown to be from about opposite the anterior border of the first molar to a line just beyond the posterior root of the third premolar. This anterior limit corresponds to the position of the infraorbital foramen. The mucous membrane of the middle meatus of the nasal cavity curves markedly downward and backward, posteriorly, to meet the floor of the nasal cavity; there it forms a large lateral fold and a medial lip at the entrance of the sinus, making the sinus an almost closed cavity open only in its lower anterior portion. A few shot were placed in the opening of the sinus and tract leading to the sinus from the nasal cavity (this tract is actually a part of the nasal cavity). From the figure it can be definitely seen that if the projected shot is a tract, the sinus is to be compared to a peninsula. Though the sinus communicates with the ventral meatus, the middle meatus has a more direct opening. The tract to the sinus from the ventral meatus passes over the base of the attachment of the ventral turbinate, passes downward and backward to enter the opening of the sinus. The middle meatus which is near the roof of the nasal cavity has quite a drop to communicate with this opening.

Lining this sinus is a thick mucous membrane. Forming the walls of the sinus are: medially, the lamina lateralis, a rather thin plate of bone projecting from the ethmoid; and laterally, principally the medial wall of the infraorbital canal supported above by a narrow strip from the malar and maxillary (facial portion) bones. These bones blend posteriorly, below, and above to form a blind cavity which is elliptical-shaped on cross section.

The antero-medial root of the fourth premolar (shear tooth) in most of the specimens examined gave rise to a small raised area about the size of a millet seed in the floor of the sinus but did not penetrate the thick mucous membrane over-lying the floor at this point. The position of this antero-medial root is shown in the figure. In other specimens examined the antero-medial root extended just up to or nearly to the sinus. The two lateral roots of this tooth project into the plate of bone lateral to the infraorbital canal.

In one specimen of the brachycephalic type (Boston terrier) the maxillary sinus was comparatively large in comparison to the extent of the maxillary bone.

THOUGH the frontal sinus has less clinical importance than the maxillary sinus, it is in most cases quite large. In the figure it is outlined by the shot as a separate triangular-shaped structure not communicating with the maxillary sinus as in the equidae. Actually, in considering the

sinus as a whole, it is a blunt-wedge shaped cavity with the base externally.

The two plates of the frontal bone divide much as they do in the horse, one forming a portion of the face, the other passing downward and forward to form a covering for the brain, then passing back up and forward to meet the plate of the face. The sinus lies entirely within the frontal bone; the deepest portion being about on a line between the supraorbital processes; the most lateral portions being in the supraorbital processes; and medially the two, left and right, lie side by side separated by a thin plate of bone. There is a thin septum of bone (which may be absent) beginning about one-half way back on the mid-plate and extending forward and a little outward to form a small medio-anterior compartment and a large posterior compartment. The sinus (both compartments) communicates anteriorly through narrow openings (two) with the dorsal meatus of the ethmoid bone.

The frontal sinus of the brachycephalic dog studied was very small, about the size of a large pea. It was located in a position opposite the antero-lateral part of the cranial cavity just beneath the upper portion of the orbital ring. Zietzschmann mentions that occasionally this sinus may be absent in the brachycephalic breeds.

References

Sisson: The Anatomy of the Domestic Animals.
Zietzschmann: Anatomie Des Hundes.

In Europe, beds for the dairy workers are built into the walls of the cow stalls.

* * * *

The annual income of the dairy industry the world over, is estimated at 25 billion dollars.

* * * *

In the United States, a dairy cow fed a high concentrate ration, is considered good if she produces 4,000 pound of milk annually, but the average production of dairy cows in the countries of Northern Europe on pasturage and roughage, is 5,500 pounds of milk per year. The program of a European dairyman and of European governments is to develop a strain of cattle in the country that will produce more for that country, rather than as is done here, to import some high-producing breed or animals from a different locality.

* * * *

The average yearly production of dairy cows in Denmark is 7,150 pounds of milk containing 272 pounds of butter fat. In this country, the averages are 4,250 and 180 pounds, respectively. The 68% greater production of Danish cows is attributable to better breeding and better feeding. Forty-two per cent of the cows in Denmark belong to dairy improvement association herds and are tested. Only 2% of the dairy cows in the United States are tested by such associations.

Horses with Horns

Every veterinarian has heard of the unicorn—the mythical single-horned horse—but few realize that occasionally an actual horse may be found with horn-like protuberances on his forehead. These are not, however, true horns.

In true horns we have a modified hair growing from the skin and supported by a bony structure underneath. The elevations, or false horns, of the horse are nothing more than raised bony protuberances of the skull covered with skin and hair. They are not comparable with the horn tissue of cattle and sheep.

In seeking for some logical explanation of these structures, it appears that the phenomenon is best explained from the structural standpoint.

This conclusion was reached by S. Harmsted Chubbs, whose study of the subject appeared in the May, 1937, issue of Natural History Magazine. Chubbs' explantation is essentially as follows:

The cranium of the embryonic horse is made up of forty cartilaginous structures which are molded and changed in shape and proportion in a complicated manner as they increase in size with increase in the age of the fetus.

There is competition in bony growth from the beginning. The wings of the sphenoid bone grow too fast for the outside expansion of the growing skull. The wings of the orbito-sphenoid grow upward while still in the cartilaginous stage and put pressure on the frontal bones, causing projections in exactly the same location as the so-called horns. In the normal skull growth the frontals overtake the fast-growing wings of the sphenoid, and only slight depressions are left where the pressure was exerted on the frontal bones. In a very few cases that the orbito-sphenoid continues to outgrow the frontals and to ossify, causing what is known as "horned horses."

These abnormalities in no way affect the practical usefulness of the animal, although some may dislike these blemishes.

A systematic search was made by the author of all the horses brought into the veterinary clinic at Kansas State College, and also all the cavalry horses at Fort Riley. During the last six months a manual examination of the heads of 2,587 horses showed only three to have "horns"; one, a roan gelding owned by Mr. L. J. Healey, of Alta Vista, had a "horn" only on the right side.

The second horse, showing "horn" development more than any other, was a six-year-old, iron grey gelding belonging to Mr. William Park, located four miles east of Manhattan. Its "horns" were three-quarters of an inch long, three inches apart and five and one-half inches above and medial to the medial canthus of the eye. This animal is shown in the accompanying illustration.

The third horse was a thoroughbred belonging to the Ulrich Farms at Manhattan. The horse "Plas Rogers", sired by "Irish" out of "Dear Nannette", has a pair of small "horns". This seems to support the belief that the phenomenon is of structural origin and that it is not limited to certain breeds, but may occur in any animal from thoroughbred to farm horse.

C. O. Tackwell,
Manhattan, Kans. K. S. C., '38.

Microfilaria Found in the Skin

The *Dirofilaria immitis* is a species of blood parasite inhabiting the cavities of the heart, ordinarily those of the right side of the heart, and the large blood vessels adjacent. Much less frequently, these parasites are found in the lungs and, on occasion, usually in extremely heavy infestations, they may be found in other parts of the body. In certain instances, even when the microfilaria (larvae) are plentiful in the peripheral blood, no adult parasites are found on postmortem examination; although, of course they must of necessity be present somewhere in the tissues.

Dirofilariasis of dogs is very common in southeastern Texas and in the Horning and McKee clinic, an examination of the blood for microfilaria is part of the routine examination of all patients hospitalized.

A pustular condition resembling demodectic mange, but in which demodex parasites were not found, has been noted frequently in heartworm cases. However, it was something of a surprise in an examination of a three-year-old Boston with a skin condition resembling the folicular type of mange, to find microfilaria in the pustules. There were some pustules on the hind legs of this patient no different in appearance from the pustules commonly seen in folicular mange. When the pus was squeezed out of these and examined under the microscope, plentiful microfilaria were seen. These larval parasites were present in pus containing not the slightest tinge of blood and as no demodex parasites could be recovered, it seems reasonable to suspect they may have been responsible for the condition of the skin.

In addition to its interest, this finding emphasizes again the necessity of careful examination for the presence of internal parasites in practically all skin ailments of dogs. Even where external parasites are recognized as the cause of a dermatitis consideration should be given to the possible contribution of internal parasites to *ens morbi*.

A. J. McKee.

Houston, Tex.

*Excerpts from a paper presented at the annual meeting of the State Veterinary Medical Association of Texas, Houston, January 13-14, 1938.

Operation on a "Roarer"

Anesthesia: Chloral hydrate to stupify and novocain locally.

Surgeon: Dr. James Farquharson, Colorado State College, Fort Collins, Colo.—*From the Clinic of the A. V. M. A., Omaha, Nebr., August 20, 1937.*

Measures for Rabies Control

Indianapolis has passed a dog ordinance providing for two types of licenses. Dogs vaccinated against rabies within 30 days of the issuance of the license are permitted to run at large. If not vaccinated against rabies, the license permits the owner to keep the dog confined on his premises and to permit him on the street while on a leash, but not otherwise. At the dog pound, licensed dogs must be kept separated from unlicensed animals and the owner has five days in which to redeem the former. A licensed dog cannot be released to any but the owner without vaccination. Unlicensed dogs may be taken from the pound by paying a license fee and having the dog vaccinated.

The Use of Tetrachlorethylene and Arecoline Hydrobromide in Pregnant Bitches

Veterinarians have been careful not to use tetrachlorethylene and arecoline hydrobromide in bitches during pregnancy. Printed directions supplied by manufacturers or dispensers of these drugs usually caution against their administration to pregnant bitches. Some veterinarians have advised their limited use in the very early stages of pregnancy, but in no case have I found their unrestricted use advocated during pregnancy.

Dr. Cassius Way, New York, N. Y. procuring bacteriological cultures from the cervix.

This is an important step in the routine examination of mares for causes of sterility. A wide-opening vaginal speculum of the Knowles type is used to dilate the vagina. A loop of heavy platinum wire the same as used for bacteriological work is mounted on a holder about 18 inches long. The needle or loop is flamed and inserted into the cervix without touching the sides of the vagina or speculum and the mucus or exudate which is picked up on the loop is implanted on agar slants or in special hormone boullion tubes and incubated at 37°C. (98°F.) for 36 to 48 hours. *Strept. genitalium, Staph. aureus and albus,* and various other organisms are usually recovered from infected mares. No anesthesia and usually no special restraint is necessary. It is well to bandage the tail. The external genitals should be thoroughly washed with soap and water and rinsed with an efficient antiseptic solution such as therapogen. Cleanliness and a sterile needle will avoid contaminated cultures which are always misleading. —*From the Clinic of the A. V. M. A., Omaha, 1937.*

Occasionally pregnant bitches are found to be heavily infected with hookworms and tapeworms. It is then considered almost a certainty that the bitch cannot develop a normal litter of puppies because of the severe drain caused by the parasites, and the resulting anemia. There is good reason to expect that puppies born under such circumstances will speedily become infected with hookworm and tapeworm and, as is well known, such puppies are exceedingly difficult to raise. The starvation period before administration of tetrachlorethylene is also disadvantageous to a lactating bitch because she usually needs all the food she can consume to produce milk.

Two years ago, I began very cautiously to administer my customary anthelmintics to pregnant bitches. In the experimental kennel of which I have charge there are usually approximately 150 dogs. The routine procedure in parasite control is as follows: After withholding all food for 36 hours, we administer one No. 00 hard gelatine capsule filled with tetrachlorethylene for each 10 pounds of body weight of the dog. A No. 00 capsule holds a small fraction less than a cubic centimeter and experience, including repeated fecal examinations, has shown that this quantity is effective in ridding dogs of hookworms and roundworms. One hour after the tetrachlorethylene has been administered, arecoline hydrobromide is given at the rate of one-eighth of a grain for each 15 pounds of body weight; and after another hour, we feed. The arecoline hydrobromide removes tapeworms and is also a powerful laxative.

We have found it unnecessary to administer any anthelmintic for whipworms because the dogs become rid of them automatically over winter, when reinfection is prevented by cold. (See *Vet. Med.*, Feb., 1937, pp. 69-70).

PREGNANT BITCHES TREATED WITH TETRACHLORETHYLENE AND ARECOLINE HYDROBROMIDE, BY WEEKS AND BY BREEDS

	Week of Pregnancy at time of treatment								
Breed	1	2	3	4	5	6	7	*8-9	Total
Cocker spaniels	12	7		2		5	2	2	30
Bloodhounds	2	3	4	3	2		2	3	19
Beagles	1		2	2	1	1	2		9
Bullhounds				1	3		2	1	7
Pointers		1		1				1	3
Scotties	1		2			1	2		6
Foxhounds			2		2	2	1	1	8
Mongrels	2	1	1	1	4	2		3	14
Setters				1		1			2
Total	18	12	11	11	12	12	11	11	98

*Eighth and ninth weeks are grouped since the "ninth week" seldom contains seven days.

From a cautious beginning, more and more hook-and-tapeworm-infected pregnant bitches were treated with the regular dosage as outlined above. The weight of each bitch was calculated according to her normal, non-pregnant weight, because obviously we were attempting to rid the same number of cubic inches of intestinal content of the parasites as before the bitch was pregnant. When no ill effects ensued from the administration of the regular anthelmintic treatment to a number of pregnant bitches, the practice was extended until now it is our routine procedure whenever fecal examinations indicate infestation with hookworm or tapeworm. To date, a total of 98 of our pregnant bitches, most of them valuable brood animals, have been so treated, and we have not observed any ill effect from the use of this combination of anthelmintics in pregnant bitches.

Each of these anthelmintics has been used alone also. When the tetrachlorethylene is used alone, epsom salt is used as a laxative an hour after the tetrachlorethylene. In these cases, likewise, no ill effects have been observed.

The results have thus been most satisfactory, and we have found it far easier to raise puppies after eliminating at least one source of infestation.

This experience is presented in the hope that the information may be useful to veterinarians, especially to those whose previous teaching on the subject may have made them over-cautious about treating pregnant bitches. Experience in our kennel has indicated so definitely the value and safety of this system of parasite control during pregnancy, that we shall continue to use it freely.

The accompanying table shows the number of dogs treated according to the gestation week, and by breeds.

LEON F. WHITNEY.
New Haven, Conn.

Veterinarians' Creed

To regard my profession as something more than a means of livelihood;

To value character more highly than reputation and truth above popularity;

To be merciful and humane, preventing needless suffering among dumb beasts;

To be faithful and zealous, preventing needless loss to those I am called on to serve;

To guide my conduct by sober judgment and my judgment by a never-sleeping conscience;

To be modest and open-minded and thankful for every opportunity to increase my knowledge and my usefulness;

To be a co-worker with my fellow practitioners by the mutual interchange of counsel and assistance;

To be true to myself, measuring my success by the value of the service I render rather than by the fee I receive.

From the presidential address by Dean R. R. Dykstra at the seventy-first annual meeting of the A. V. M. A., August, 1932.

Some Phases of the Control of Bang's Disease*

By C. R. DONHAM, Columbus, Ohio
College of Veterinary Medicine,
The Ohio State University

Doubtful Reactions

Indecisive reactions to the agglutination test for Bang's disease cause much confusion and discussion by veterinarians and cattle owners. It would be a simple matter to control Bang's disease if all animals were either positive or negative reactors, but neither the agglutination blood test nor any other biological phenomenon works that way. We always have the in-between, uncertain reaction.

At least three types of animals are found in Bang's disease testing that are neither definitely positive nor definitely negative to the test. They are:

1. The recently-infected animal in which there is a low but rising titre. It constitutes a dangerous type of infected animal. Subsequent tests usually reveal a higher titre, and consequently the doubtful reaction becomes a positive one.

2. The doubtful reaction resulting from a decreasing titre in an animal; usually an animal that has been a positive reactor for a considerable time. Such decreasing titres are not particularly common from a percentage point of view, but they occur in many infected herds. Subsequent tests of such animals usually show either the same or a lower titre, and the animal either becomes negative or remains a suspect. Few such cows eliminate Brucella organisms and are dangerous. Their status is always open to controversy. There are two schools of thought relative to the proper disposition of such animals. One group considers such cows potentially dangerous and that it is a mistake to keep a few of this type, thereby gambling their value against the chance of carrying infection to the remainder of the herd after eliminating the positive reactors. The other group contends that animals with this type of reaction are somewhat resistant to Bang's disease, and are, therefore, more valuable than completely negative animals.

3. The third type of doubtful reaction results from native, natural or non-specific agglutinating substances in the blood of non-infected cattle. The percentage of non-infected animals which show such indeterminate reactions is dependent on many factors. When suitable antigen and agglutination technic are used, the percentage in non-infected animals is negligible. However, under certain testing conditions, the percentage of non-infected animals that show uncertain reactions becomes intolerable. Practically all adult bovine animals have non-specific agglutinating substances in the blood, which can be demonstrated when an extremely low dilution, say 1 to 1, is employed. When attempts are made to make the agglutination test severe by employing low dilutions, the stigma of being a suspect is placed on an important percentage of cattle that are not and never have been (so far as can be determined) infected with Bang's disease. Under such conditions the object of the test is defeated, and harm results. Subsequent tests of such animal cases may reveal either the same or a negative reaction.

In a single test it is impossible to differentiate the foregoing three types of doubtful reactions. It is necessary to conduct more than one test and then exercise judgment and common sense in the interpretation of agglutination reactions to most effectively and fairly determine the status of animals showing doubtful reactions.

Interpretation of Agglutination Reactions

The agglutination test is an invaluable aid in diagnosis, but should not be the sole evidence upon which a diagnosis is based. All too frequently the diagnosis is arrived at according to hard and fast rules for interpretation of agglutination titres. This is wrong; such practice ignores the fundamental principle of diagnosis, namely, to consider and weigh all available evidence. It is absurd to try to operate according to inflexible standards in interpreting doubt-

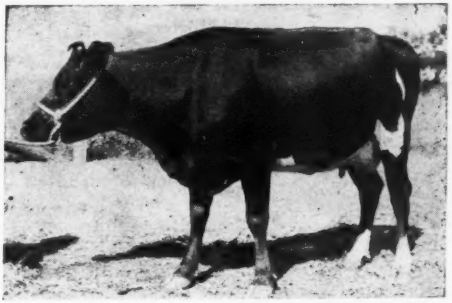
*Presented at the 10th Veterinary Conference of the College of Veterinary Medicine, The Ohio State University, Columbus, O., June 16-18, 1937.

ful agglutination reactions. We must have certain schedules for interpretation of agglutination results as a guide, but we certainly should not let such standards supplant common sense and ordinary good judgment in making diagnoses.

All reasonable persons will agree that the veterinarian who sees the cows and talks with the owner or herdsman and learns something of the herd has a tremendous advantage over the veterinarian or technician in some distant laboratory when the time comes for final decision on doubtful cases. The responsibility of diagnosis in these cases should rest with the field veterinarian. Obviously, the success of such a policy depends upon a responsible, adequately trained personnel of field veterinarians. At the start of the federal Bang's disease project in 1934, no state had sufficient force of such field veterinarians. Similar conditions may still exist to a lesser degree in some states. However, we should consider that the veterinarians of America have become Bang's disease-minded during recent years, and they have made and are making rapid progress toward informing themselves concerning the scientific control of the disease.

There are a few control officials who believe that centralized control of diagnosis is necessary. We would remind these men that the field veterinarians have carried the full responsibility of diagnosis in the tuberculosis eradication work, and further that no real progress was made in this program until this situation was obtained. There is far more to the job of controlling and eliminating Bang's disease than the routine collecting and testing blood samples. In all medical practice the diagnosis of disease rests with the physician, never in the laboratory. Laboratory examination is an aid to, not an end in, diagnosis. Its sole purpose is to supply information to the diagnostician.

The field veterinarian's interest in the whole project is quite naturally and very largely in ratio to the responsibility placed in him. If he is merely a "bleeder" he is prone to become a disgruntled, disinterested, bread-and-butter worker. When he is the responsible diagnostician acting in an official capacity he accepts that responsibility enthusiastically. The result is that the whole project is elevated to a basis of greater efficiency. The cattle industry of America is dependent on the integrity of the veterinary profession and everyone



Serviceable halter for restraint in Bang's disease testing.

knows that we have merited the trust which has been placed in us. The success of the tuberculosis eradication project is a sufficient answer on that score.

Period of Incubation

The period of incubation in Bang's disease is defined as the interval of time between infection and the appearance of specific agglutinins in the blood stream. It has nothing whatever to do with the presence or absence of abortion, which is merely one of the symptoms of infection. Its importance in Bang's disease control cannot be overestimated. The average incubation period is usually given as from 10 to 12 weeks. This, however, does not mean much to the veterinarian trying to control the disease. He is more interested in the minimum and maximum periods of incubation. Under natural conditions, the minimum period is usually from two to three weeks. This means that it is frequently necessary to retest infected herds every two weeks. The maximum period of incubation may be several months, which means that in infected herds frequent testing may have to be continued for several months. It is known that some cows that become infected after they become pregnant will not show a positive agglutination reaction until some time after the termination of that pregnancy, either by abortion or normal

calving. This is another reason why negative agglutination reactions should not be considered as positive evidence of the absence of infection until several months have passed, particularly in pregnant females in infected herds.

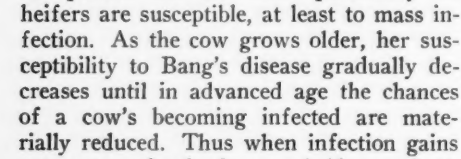
Susceptibility

Susceptibility refers to the capacity of the animal to harbor Brucella organisms in a state of infection and to develop agglutinins and has nothing whatever to do with the presence or absence of the symptom of abortion. Rarely do we find an entire herd of cattle infected with Bang's disease. Some points regarding susceptibility have not received sufficient emphasis during recent years when general interest in the disease has greatly increased as a result of the federal Bang's disease project.

The baby calf is essentially non-susceptible to the disease. This constitutes one of the important differences between Bang's disease and bovine tuberculosis. There is a period of non-susceptibility in Bang's disease; there is no such period in tuberculosis. When the calf reaches the age of puberty, the susceptibility curve jumps considerably, but not to its peak. When the breeding age arrives and the young female has conceived, we have the most susceptible period. At this time practically all heifers are susceptible, at least to mass infection. As the cow grows older, her susceptibility to Bang's disease gradually decreases until in advanced age the chances of a cow's becoming infected are materially reduced. Thus when infection gains access to a herd of cows, heifers, calves, and bulls, it is extremely unlikely that all of the animals will develop the disease.

Vaccination

All veterinarians, regardless of their varied convictions pertaining to the merits of vaccination for the control of Bang's disease, should be interested in the following press release to the laity by the Federal Bureau of Animal Industry:



VACCINATION OF CATTLE AGAINST BANG'S DISEASE STILL EXPERIMENTAL, MOHLER CAUTIONS

The vaccination of cattle against Bang's disease during calfhood is a promising means of combating this serious cattle malady, says Dr. J. R. Mohler, chief of the Bureau of Animal Industry, United States Department of Agriculture. "Yet," he cautions, "this procedure is still in the experimental stage, and livestock owners should hesitate to place faith in claims that promise more than scientific findings to date warrant."

To correct erroneous and misleading statements that have come to its attention regarding vaccination for Bang's disease, the Bureau summarizes present scientific knowledge on this subject:

Use Is Limited Chiefly to Calves

The Bureau's investigators have found a vaccine prepared with a *Brucella abortus* strain of low virulence, and used only on calves between four and eight months of age, to be an encouraging means of coping with Bang's disease. Calves have appeared to be more resistant than mature unbred animals to the vaccinal infection, and the agglutination reactions induced by the vaccine injections have given indication of being of shorter duration in calves than in unbred heifers of near-breeding age, or in unbred cows.

Because the vaccine, as now prepared, contains living Bang's disease germs, although of low virulence, it should be administered by those veterinarians who are familiar with the precautions that should be observed in the use of living vaccines and who are qualified to judge with reasonable accuracy when and where the use of vaccine is indicated. Vaccine is a preventive only, not a curative agent. Hence it cannot be expected to benefit cattle already infected.

Vaccine should not be given to pregnant cattle, as it may cause them to abort and thus spread infection. It also may cause them to spread infection in the case of a seemingly normal birth. Nor should the vaccine be used in herds that are free from Bang's disease. The vaccination of mature cattle even though non-pregnant is considered inadvisable.

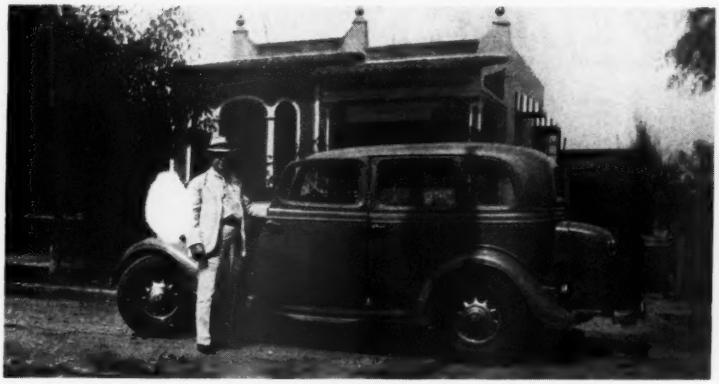
Must Await Results of Field Tests

Although calf vaccination continues to give encouraging results in controlled experiments, it is important that the method give similar results in extensive trials under herd and farm conditions before one may properly conclude that the method merits adoption on a large scale.

The Bureau of Animal Industry is cooperating with about 250 herd owners in different states in a calf vaccination experiment on farms where 15% or more cattle have reacted to the Bang's disease test. It is proposed to continue this experiment until such time as all cattle in these herds will be those vaccinated when calves.

Tropical Pneumoenteritis of Calves*

By GUY A. ROBERTS, Ciudad Trujillo, D. R.,
Director de Sanidad Pecuaria, Gobierno Dominicano



Dr. G. A. Roberts in front of his home in Ciudad Trujillo

THROUGHOUT the tropics and near tropics, extending well into Brazil, many calves are lost annually from an ailment that appears not to have been described heretofore in the veterinary literature of the United States or Europe. Some of these calves appear very stupid, hence the term bovera (or bobera) from bobo, meaning a fool, is used in some countries. A good many cases show characteristic symptoms of pneumoenteritis; hence this term is used exclusively in other tropical countries, and apparently refers to the same condition.

The writer encountered many such cases in the states of Sao Paulo and Minas Geraes, Brazil, and they are making him bald here in the Dominican Republic because of their number and his inability to save them. Herd owners report that in some years more than 50% of the calf crop is lost. The death rate in visibly affected cases is always high, often 90%, or more.

The trouble occurs in calves from a few days to six months of age, most cases occurring between the ages of six weeks and four months. After the age of six months, they seem to be immune. We have observed the trouble only in purebred or grade dairy herds. Apparently native calves are immune, or at least possess more resistance than those more recently imported.

While pneumoenteritis is quite general throughout the Dominican Republic, there are sections in which few, if any, cases occur. Again, it is most frequently observed in herds in which a large part of the milk is removed from the cow, leaving a small amount for the calf. Also, the calves are often crowded into small corrals or sheds at night, and occasionally for half the day. The trouble does not seem to have any distinctive seasonal appearance, for it may occur in any month, and is much worse in some years than others.

Etiology. — Until recently investigators have been attempting to detect a specific cause for the disease, but many are now convinced that it is not one but a group of diseases, difficult to differentiate.

It may be possible that through better hygienic and sanitary measures, many cases can be avoided, since it is confined almost wholly to dairy herds in which the calves are poorly nourished and crowded. Some cases in calves a few days old are undoubtedly white scours, and older calves occasionally

* Presented at a meeting of the Houston Veterinary Association, Houston, Texas, Feb. 4, 1937.

show typical omphalophlebitis, often with enlarged joints.

Again, in a large percentage of cases in calves over six weeks of age, the writer has found, here in the Dominican Republic, many apparently initiated by an infection with *Anaplasma marginale* (anaplasmosis). However, the elimination of the protozoon from the blood has had little influence upon the ultimate course of the disease.

In the tropics, gastrointestinal parasites would naturally be expected to play a part, and no doubt they do in some cases, but we have found many cases of the disease in herds in which parasitic infestation is very limited.

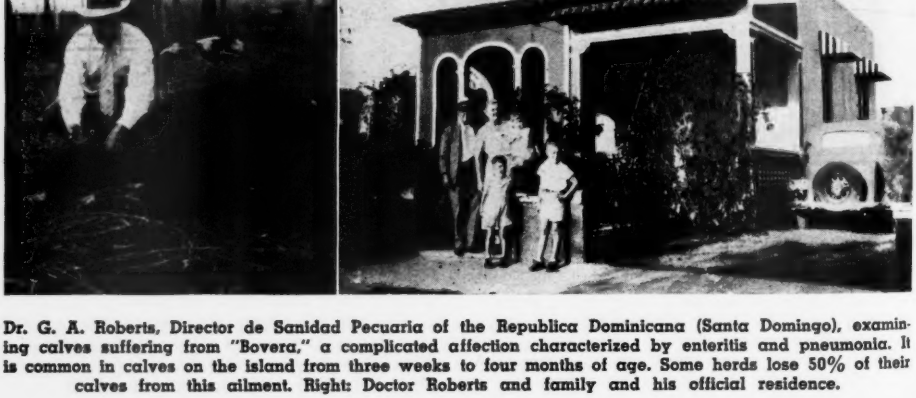
Symptoms.—These are naturally variable, but are usually first detected by less than normal activity followed by standing dully apart, with the head nearly touching the ground. Often there is more or less lacrymation together with mucous discharge from the nose, and not infrequently, some salivation. Temperatures range from 104°F. (40°C.) to 106°F. (41.5°C.) or more, with a corresponding increase in pulse and respiration.

As the case advances, the animal becomes thin and weak, stands with legs apart, walks with wobbly gait, and finally when down, it may assume the attitude of a cow with milk fever, or lie prone with muzzle extended; or it may even show a meningeal involvement with the head extended backward (opisthotonus). Few cases fail to show, sooner or later, symptoms of both pneumonia and enteritis, although some show neither. Examination of the blood often shows only 30% of hemoglobin.

The disease usually runs its course in seven to ten days, but may be longer or shorter. No doubt many mild cases escape detection, but some 80% or more of the recognizable cases, and all of the serious cases, die.

Lesions.—Because of the multiple infections, the lesions are not constant. The carcass is invariably emaciated, the coat dull and rough. Usually the mucous membranes are pale; there is mucus within the nostrils and signs of earlier diarrhea. Occasionally there is some excess pleural exudate. The lungs may show limited areas of bronchopneumonia, with slight edema, or, apparently in more chronic cases, large areas of a granular, fibrous lobar pneumonia exist.

The liver may appear normal, but is usually somewhat pale, or distinctly yellowish. The spleen is usually slightly enlarged and somewhat degenerated. Both liver and spleen lesions suggest anaplasmosis. The kidneys show little alteration; the urine being clear.



Dr. G. A. Roberts, Director de Sanidad Pecuaria of the Republica Dominicana (Santa Domingo), examining calves suffering from "Bovera," a complicated affection characterized by enteritis and pneumonia. It is common in calves on the island from three weeks to four months of age. Some herds lose 50% of their calves from this ailment. Right: Doctor Roberts and family and his official residence.

The mesenteric lymph glands and vessels are more or less injected, thickened and reddened and the mucous membranes show some redness.

Treatment.—Nearly all the drugs in the pharmacopeia, including many biological products, have been tried, but with doubtful benefit. It is hoped to carry on further investigation of this ailment. At present, we are able to recommend only better hygienic and sanitary measures. These measures consist of disinfection of the umbilical cord when the calf is born in a shed or corral, providing sufficient, suitable feed, dry, comfortable sleeping quarters and ample space. During the day the calves should be turned out into a well-drained pasture of young, tender grass.

* * * *

When Is a Contract Enforceable

Can you give me information about signatures, and whether, when I, as agent, sign for my employer, I am liable?—A. L. R.

Reply: A review of higher court cases discloses that an employee is personally liable, (1) where he knowingly makes a false written or oral statement or representation of his authority with intent to deceive a person who transacts business with his employer; (2) where he performs unlawful acts with authority of his employer; (3) where he performs a damaging act believing he has authority, but actually has none; (4) where under all circumstances he wilfully performs any act which results in damage to anyone; (5) where he performs damaging acts outside his scope of authority, although he intends to render his employer a valuable service; and (6) where he assumes an obligation for his employer.

Frequently litigation arises where an employee signs a contract intending to bind his employer when in fact he makes himself personally liable without in any way obligating the employer.

Sometimes an employee is solely liable for obligations created by signing a contract or other paper when intending to bind his employer. In other instances, his employer also is liable. However, as a general rule the employer is relieved of liability where the employee exceeds his authority and affixes a signature outside the scope of the employment, but the employee may be liable for resulting damages.

For instance, in a higher court case (101 Pa. 311), it was disclosed that an employee exceeded the authority given by his employer and signed a contract intending to obligate the latter. When the employer learned of the nature of the contract, he refused to fulfill the agreement. The other party to the contract sued the employee who attempted to avoid liability and testified that he had acted in good faith when signing the instrument, believed he had authority to make valid contracts for his employer. However, the court held the employee personally liable, and said:

> The reason why an agent is liable in damages to the person with whom he contracts when he exceeds his authority, is that the party dealing with him is deprived of any remedy upon the contract against the principal, which is not his in fact, and it is but just and fair that the loss, occasioned by there being no valid contract with him, should be borne by the agent who contracted for him without authority.

Other courts have held that an employee may be solely liable on a contract which he signs by authority of his employer. For illustration, in a leading case (17 O. S. 215), it was shown that an employer authorized his employee named Ed. Collins to sign a valid contract. The employee failed to include his employer's name in the contract, but signed it "Ed Collins, Agent". The employer refused to assume obligations under the contract and the other party sued Collins.

During the trial Collins introduced evidence proving that his employer had given him authority to sign the contract. Notwithstanding this testimony, the court held Collins personally liable. This court stated the law to the effect that an employee is personally responsible on a contract which is written and signed in a manner which indicates to the other party that the employee intended to be bound.—*Leo T. Parker.*

Diseases Transmitted to Man by Meat and Meat Products*

By L. W. GOSS, Columbus, Ohio
College of Veterinary Medicine,
The Ohio State University

The diseases which are possible of being transmitted to man by meat and meat products are numerous. It behooves the inspectors of meat products, namely veterinarians, to always be on the alert and aware of all indications of the presence of these diseases in order that they may guard the health of the public against the transmission of these conditions.

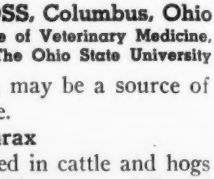
We read of plagues which visited whole peoples in Biblical times. Some of these were diseases which were undoubtedly transmitted through food products. Once some of these diseases, which were common to animals in those days, were introduced they might have continued to spread through man because of lack of knowledge of the epidemiology of the disease and their lack of sanitation. With the present system of meat inspection in America, the possibility of the transmission of these diseases is reduced to the minimum for about two-thirds of our meat food products: namely, that portion of these foods which comes under government or municipal inspection. It is a somewhat different matter with the other one-third of our meat food products which are slaughtered by the farm producer or by the local butchers in small communities. Since the advent of the automobile there has been a great increase in the number of meat markets distributed along the highways just outside of our larger cities. These places in many instances are selling meats which are not subjected to inspection because of the lack of state or county laws to regulate the inspection of such products. These are always a source of danger. The public is ignorant of these dangers and seems to think that all that is necessary is to get fresh slaughtered meats, which to them is in the same category as buying fresh eggs in the country.

Let us consider some of the diseases of animals which, while they are rarely encountered in this area, may be a source of danger to many people.

*Presented at the 10th Veterinary Conference of the College of Veterinary Medicine, The Ohio State University, Columbus, O., June 16-18, 1937.

Anthrax

Anthrax has occurred in cattle and hogs in nearly all states of this country. Affected animals could well be slaughtered and offered for sale in the absence of inspection. The ante-mortem and post-mortem inspection under our well regulated government systems eliminates the possibilities of meat carrying this disease being offered to the public. The septicemic nature of this disease makes it rather readily recognizable as a disease of such a nature as to be harmful to man.



The Author

Cases of Anthrax by Occupation (Andrews[1])

Occupation of Workers	Total
Hide, skin, leather, hair and wool industries	58
Transportation workers	12
Farmers	3
Veterinarians	1
Longshoremen	2
Miscellaneous	14
Total	90

Cases of Anthrax by Occupation, U. S. (Smyth[2])
(1919 to 1927)

Tanning Industry	188
Wool Industry	50
Cattle	49
Shaving Brushes	48
Hair and Fur	41
Veterinarians and Students	3
Transportation	2
Sources not Stated	343
Total	724

[1] Andrews, J. B., 1920. U. S. Department of Labor, Bureau of Labor Statistics, Bull. No. 267.
[2] Smyth, Henry Field, 1924. *Am. Jnl. Pub. Health*, 14: 920-924. Also report of Anthrax Committee of A. P. H. A., Oct. 20, 1927.

Hog Cholera

There probably is great danger of hogs being slaughtered in the acute stages of hog cholera in that there probably is more pork slaughtered and sold in these small road-side markets than beef. Although man is not susceptible to hog cholera we readily recognize that hog cholera is usually associated with other infections, which are capable of producing septicemic conditions. These organisms are well disseminated through the meat in the earlier stages of the disease. It is most probable that this condition would not be recognized by the layman even though we give him credit for being honest; or it may be sold by the unscruplous dealer in such a state that even the layman could recognize that the animal is unhealthy. The presence of these organisms in this meat would cause it to spoil readily, and while it is not responsible for a specific disease, the consumption of such meat may result in the development of severe enteritis and intoxication which may further result in the deaths of individuals.

Swine Erysipelas

While swine erysipelas at the present time does not seem to be a serious disease in the United States, there are some indications that erysipelas may be more dangerous to man in meat products than to hogs which come into contact with infected animals.

Tuberculous Retro-Pharyngeal Abscess

Tuberculosis

The meat from tuberculous animals has been considered dangerous to man for a long time. In 1868 Cheveau showed that by feeding such material to other animals they became infected with tuberculosis. We cannot help but admire Robert Koch for the remarkable work he did in discovering the tubercle bacilli and tuberculin. However, he made the error of stating that tuberculosis of cattle could not be transmitted to man. This has been used many times to combat the tuberculosis eradication programs. Since his time it has been definitely proved that tuberculosis can and is transmitted from animals to man.

Tuberculosis Lesions of the Pleura

Tuberculosis has been one of the problems of large economic importance to the livestock industry for many years. An active campaign for the eradication of tuberculosis has been under way recently, and during this time most of our states have become known as Modified Accred-

ited States, in which tuberculosis has been reduced to less than 0.5%.

Under the Federal Bureau of Animal Industry[4] inspection, there were slaughtered in 1936, 61,970,474 food animals. Of this number 9,968 cattle, 139 calves, 19 sheep, 15,195 swine were condemned as having tuberculosis. In addition to this number condemned, additional parts of carcasses were condemned for tuberculosis in cases in which the infection was localized and not sufficiently develoepd to justify condemnation of the whole carcass. These parts amounted to 21,000 in cattle, 246 calves, 18,368 in swine.

Principle A.[5] No meat should be used for food if it contains tubercle bacilli, or if there is a reasonable possibility that it may contain tubercle bacilli, or if it is impregnated with toxic substance of tuberculosis or associated septic infections.

Principle B. Meat should not be destroyed if the lesions are localized and not numerous, if there is no evidence of distribution of tubercle bacilli through the blood or by other means to the muscles or to parts that may be eaten with muscles, and if the animal is well nourished and in good condition, since in this case there is no proof, or even reason to suspect, that the flesh is unwholesome.

Principle C. Evidences of generalized tuberculosis are to be sought in such distribution and number of tuberculosis lesions as can be explained only upon the supposition of the entrance of tubercle bacilli in considerable number into the systemic circulation. Significant of such generalization is the presence of numerous uniformly distributed tubercles throughout both lungs, also tubercles in the spleen, kidneys, bones, joints, and sexual glands, and in the lymph gland connected with these organs and parts, or in the splenic, renal. prescapular, popliteal, and inguinal glands, when

The government regulations are operated upon the following principles relative to the inspection of tuberculosis.[5]

The records of the U. S. Department of Agriculture, Bureau of Animal Industry, show that the number of carcasses condemned for tuberculosis under government inspection 10 years ago were five times as great as during the past year. This is not a true evaluation of the amount of tuberculosis in the country, because there are far greater numbers being tested under government inspection and forced on the market than there were at that time. These figures, however, show that the number of tubercular cattle in the United States has been reduced. This is due very largely to the activities of the veterinary profession in coöperation with the livestock industry under the able leadership of John R. Mohler, Chief of our Bureau of Animal Industry, and his co-workers. One cannot help but realize that it is something remarkable. No other country has begun to approach this marvelous record in the eradication of tuberculosis from cattle. It cannot help but contribute to the health of man. This is noticed by the great reduction in the number of children who have tubercular cervical lymph glands. Such cases used to be exceedingly numerous, while at the present time they have been reduced to a rarity.

Foot-and-Mouth Disease

Foot-and-mouth disease is of little importance concerning the health of man at the present time in the United States. However, it is a disease of great economic importance to the cattle industry. It has invaded this country on several occasions and each time has been eradicated. It is well for us to have in mind the character-

Tongue Lesions of Foot-and-Mouth Disease

istics of this disease in order that, should outbreaks occur, we will recognize the symptoms and lesions readily and check the spread of the disease before it has become extensive.

Man is susceptible to foot-and-mouth disease, although the number of cases of the disease in man are relatively rare. European medical authorities recognize that it is transmissible to man. This fact should be known and should be given due consideration in connection with the epi-

[4] B. A. I. Ann. Rept. 1936.
[5] B. A. I. Regulations.

demiology of the disease in order that we may check the spread of it more readily. The disease is readily spread to quite some distances by indirect objects. In one of the recent epidemics there was very plain evidence that the disease was carried five miles from an infected farm by the hired man who was calling upon the hired girl on the farm that became infected. It would seem that in this case it was spread by foot and mouth.

Undulant Fever

Undulant fever has undoubtedly been present in America for a great many years. The medical profession has recognized the presence of malta fever since 1863, at which time Marston described this as a Mediterranean remittent fever. In 1886 Bruce isolated the causative organism, and in 1893 named it *Micrococcus melitensis.* Infected animals or animal products are the source of the disease in man.

Bang's Disease

Bang's disease, originally called contagious abortion, was first reported by Moscall[6] in 1576; later by Lawrence in 1805 and by Skellet in 1808, as a contagious disease of cattle. However, it was not until 1896 that Bang and Stribolt discovered the organism responsible for the disease. McFadyean, Stockman, Holth, and others described the agglutination test in 1909 and 1910. Schroder and Cotten of the United States Department of Agriculture in 1911 were the first to suspect its relation to human health. In the same year Mohler and Traum published first results of the isolation of this organism from the tonsil of a child. In 1913 Larson and Sedgrick showed the presence of agglutinins and complement fixing bodies in the blood of children. Dr. Alice Evans, then of the United States Department of Agriculture, was first to demonstrate the close identity of *Bacillus abortus* of cattle and the *Micrococcus melitensis* of goats and the relationship of these to human infection (Mediterranean, Malta or undulant fever).

At the present time we recognize in this disease a serious menace to the cattle industry and also that it is encountered in swine. In 1924 Keefer reported the presence of human infection soon after which it was determined that undulant fever, discovered by Bevan in 1921, was due to infection with *Bacillus abortus.* Since this, many cases have been reported in which the infection has been traced to meat products and milk. Apparently, the porcine strain is the more pathogenic for man. The disease has been recognized most frequently among butchers, laboratory workers, veterinarians, cattle owners, and herdsmen. The extensive pasteurization of milk probably has been responsible for the relatively low incidence of this disease among the milk consuming public.

Tularemia

Tularemia was first noticed in ground squirrels in Tulare county, California, in 1911 by McCoy and Chapin.[7] It is caused by *Bacterium tularense.* Francis learned that there had been a number of cases in game in Utah between 1917 and 1920. This was traced to an epizoötic in jack rabbits and it occurred in human cases in the season of the deer-fly. At the present time the disease is very widespread among game animals. It is seen in Ohio mostly during the rabbit season and it seems that most of our infections occur from the dressing or contact with infected rabbits. It can be spread to man by fleas, ticks, flies, and lice. The organism can enter the normal skin, hence there is great danger of infection to man by merely dressing infected rabbits, pheasants, grouse, squirrels, woodchucks, muskrats, opossums and other game. It has also been recognized in sheep by Marsh. About 90% of the cases in Ohio are the result of dressing wild rabbits. According to Francis the mortality in man is about 4.9%. However low the mortality it is a serious, protracted, disabling, costly disease.

Glanders

This is a disease common to the equine family. As there are considerable horses slaughtered in the United States for dog

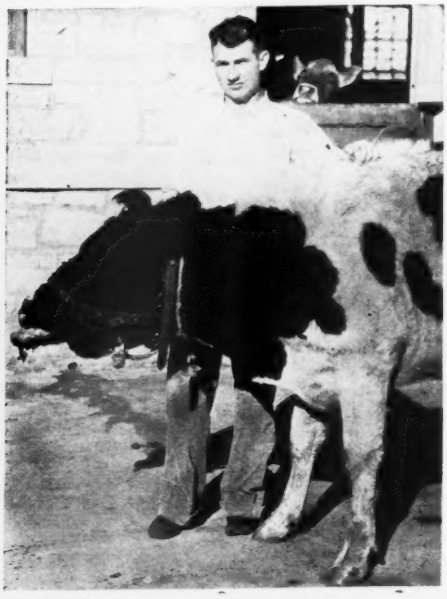
[6] "Diseases Transmitted from Animals to Man" by Thos. G. Hull, 1930.

[7] U. S. Public Health Repts., Vol. 52.

food and for food for animals in zoölogical parks. There is still a possibility of man's becoming infected through consumption of these products. Most of the horses slaughtered in the United States are slaughtered under government inspection; consequently, the opportunity for transmission to man through food products is reduced to a minimum. There is always a possibility that man in contact with horses may contract the disease. At the present time there is very little glanders in America, but it has been the history of all wars to encounter much glanders among horses, as assembling these animals in large numbers is conducive to the introduction of one animal or more with the disease, which is readily spread throughout the group. Man is highly susceptible to glanders and the mortality is exceedingly high. Therefore, it is important to give due consideration to the protection of man against this infection.

Rabies

There is much rabies throughout the United States. In Columbus we are now passing through a serious epizoötic of the disease. There is always a possibility that rabid animals may be slaughtered and consumed by the public. Those of you who love beef brains might acquire the infection through the consumption of this product from animals slaughtered while infected with this disease. This makes it highly important that all animals slaughtered should undergo ante-mortem inspection as well as post-mortem inspection, because rabies would not be recognized upon post-mortem inspection, but would be recognized by ante-mortem inspection. As the virus is found in various secretions as well as in the central nervous system, it is possible to spread the infection from other parts of the carcass in addition to the central nervous system.



Lingual Actinomycosis—Wooden Tongue

Actinomycosis

Actinomycosis is a common disease of cattle. During the past year the Bureau of Animal Industry has condemned 1,305 carcasses in which there were extensive lesions of actinomycosis.[8] The parts of cattle condemned for being affected with actinomycosis amounted to 206,887. Sanford and Voelker[9] report the presence of 656 cases of actinomycosis in the human being as having occurred over a number of years, as reported by the various state boards of health. While actinomycosis of man is probably not contracted from cattle, there is always a possibility that the infection may develop through the use of infected food products. Consequently, it is advisable to carry on the inspection in a manner that will eliminate any possibility of man contracting actinomycosis from our meat food products. The indications are that actinomycosis in man is probably contracted from a natural source as most of the cases develop in men who work in agricultural pursuits.

Meat Poisoning

In addition to the specific diseases the following group of disease conditions may be responsible for meat poisoning:

Septicemia or pyemia, whether puer-

[8] B. A. I. Ann. Rept., 1936.
[9] Sanford and Voelker. *Arch Survey* 11:809-856.

peral, traumatic, or without any evident cause.

Gangrenous or severe hemorrhagic enteritis or gastritis.

Acute diffuse metritis or mammitis.

Polyarthritis.

Phlebitis of the umbilical veins.

Traumatic pericarditis.

Any acute inflammation, abscess, or suppurating sore, if associated with acute nephritis, fatty and degenerated liver, swollen soft spleen, marked pulmonary hyperemia, general swelling of lymph glands, or diffuse redness of the skin, either singly or in combination.

When any of the above conditions exist in a carcass, large numbers of organisms may enter the greater circulation and seed the entire carcass. Under such conditions there is a hazard in consuming the meat.

Food Poisoning

Food poisoning is caused by quite a variety of organisms. For inclusion in this group, Bergey suggests some 19 members, many of which are common to the digestive tracts of man and animals. Consequently, animal products may become a source from which these organisms are disseminated, and if conditions are conducive to the multiplication of the bacteria the meat products may become exceedingly dangerous for human consumption. Of the above group of organisms the *Bacillus enteriditis* is one that is very toxic and produces symptoms somewhat resembling typhoid fever. The infection with this organism ofttimes is not of an acute, violent illness as frequently associated with many of the other organisms of this group, but illness may be continued for weeks thereafter.

Botulinus

One of the organisms responsible for mortal disease in man in that it produces a highly toxic substance is the *B. botulinus.* This is encountered rather frequently in canned vegetables as well as in meat food products. This organism as it grows produces a very offensive odor and gases, consequently, individuals are ofttimes warned of its presence; but due to its high toxic properties it may grow in quantities sufficient to produce intoxication without any appreciable odor. This is particularly true in products that have some natural odor.

It is interesting to note that dogs are not poisoned by botulinus toxins. This is probably due to the fact that it is a common contaminant of meats, and the dog family has acquired a tolerance through exposure for ages past.

The toxic properties of the botulinus organisms rank with those of tetanus; however, the action of these two toxic substances is almost directly opposite. Tetanus acts upon the central nervous system as an irritant, while botulinus toxin causes paralysis of the muscles of the pharynx and eyes.

Esthetic Considerations

There are certain peculiarities within physiological limits which probably have come to the point of pathological conditions which must be given due consideration in the inspection of meat food products. This is a condition of dead born fetuses which unscrupulous butchers may attempt to use in sausages and other products, also calves which have not yet reached maturity. While this meat is not harmful, the keeping qualities are low and the appearance of it is repulsive. Repulsiveness in meat which is offered for sale is undesirable because it not only turns the individual against that particular meat, but also against the market which offered it for sale. It justifies the suspicion that their products are not of the best. The carcasses of such animals should be given due consideration because their meats, being more or less in a state of edematous condition, readily spoil when placed in storage. Odors of meats, although not dangerous to man, are repulsive. Some of these odors gain access to meat through consumption of chemicals, plants, and other products which have odors. Some of the odors are found in male animals and are referred to as sex odors. Meat readily absorbs odors;

consequently, it should be stored in places free from disagreeable odors.

Incompletely bled carcasses contain an unusual amount of moisture, a condition conducive to the multiplication of organisms and a more rapid spoilage. Animals which are exhausted at the time of slaughter are as a rule inclined to bleed out incompletely and should be placed in the same category.

To give some idea of the extent of these conditions we find in the annual report of the Bureau of Animal Industry 24,000 animals were condemned for emaciation, 6000 cases for icterus, 5,000 calves for immaturity, 300 cases of melanosis, 3,300 cases of sexual odor, 1,400 for uremia, and 5,000 cases of generalized tumors.

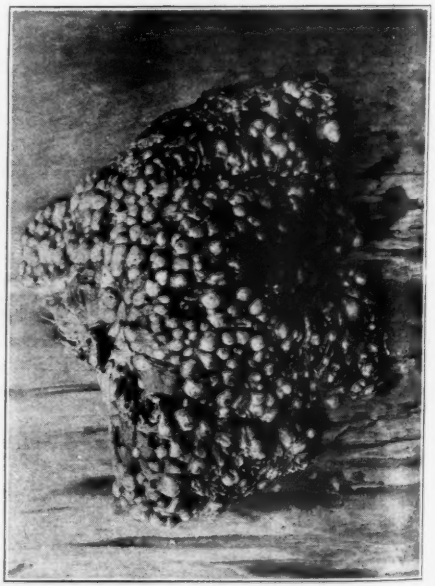
Trichinosis

In addition to the disease conditions of meat we find that animal parasites are a factor which concerns the safety of food. There has always been more or less loss of life and inconvenience due to the infestation of man with trichina. There is some question about the increased number of parasites over previous years. The report from the Bureau of Animal Industry for the past year describes an investigation into the prevalence of trichina in pork slaughtered at Chicago. A comparative study of the incidence of trichina of garbage fed hogs was compared with grain fed hogs. In 2,341 garbage fed hogs using the method of digesting one-half pound samples of muscle but slightly more than 5% contained trichina. Of the 4,740 samples of grain fed hogs examined in a similar manner only about 1% were infested with trichina. This investigation would show that trichinosis of hogs is not a very common condition in America. In this country it has not been customary to examine pork for trichinae. The public is generally aware of the fact that it is dangerous to consume pork in a raw state. This contrasts with Germany, where pork is inspected for trichina, and consequently, many Germans consume pork in a raw state. As a result of this they are led to have a false sense of security in the consumption of raw pork.

Out of 6,329 cases of trichinosis in Germany[9] in 1881-98, a careful inquiry traced 2,042 cases, or over 32%, to meat which had been microscopically examined and passed as free of trichina. This shows conclusively that our American plan of discouraging the consumption of raw pork, although our pork is not inspected for trichina, will probably result in far fewer cases of trichinosis. In America in our packing houses there are certain meats produced for consumption in the raw state. All such meats are refrigerated or pickled in such a manner as to make it impossible that there will still be any live trichina left in the product. This can be done by lowering the temperature to 5° F. and holding it at that temperature for 20 days. Such trichinosis as occurs in man in this country probably results from eating raw pork from slaughter houses not having federal inspection, where no precautions are taken for the safety of the consumers of such products.

The Ohio State Health Department has

[9] Edelmann's Meat Hygiene.



Liver of Swine Infested with Echinococcus Cysts.

reports of trichina occurring in man. The most common symptoms of this disease are edema beneath the eyelids, abdominal pains, enteritis with some diarrhea at times. Later on muscular symptoms become apparent and indications of inflammation of muscles, fever, and possibly dyspnea, the eosinophils greatly increased, sometimes reaching as high as 25%.

"Measles" of hog heart—Cysticercus cellulosae, the cyst stage of the Taenia Solium.

Tapeworm

Cysticercus cellulosa is the cystic stage of the *Taenia solium* which infests man. These tapeworms have a row of hooklets and four suckers with which they attach themselves to the intestinal wall. They may attain a length of 30 feet. These cysts are found in the muscles of hogs. It is also possible for these cysts to infest man. This parasite, however, is relatively rare in pork.

Cysticercus bovis, the cyst stage of *Taenia saginata,* the tapeworm found in man's intestine is provided with four suckers, but has no hooklets for its attachment. It may acquire the length of 40 feet. Cysts are found in cattle and are most conspicuous in the masseter muscles and in the heart muscle. If these cysts are consumed in the raw state in man, they develop into the adult tapeworm. The government system of inspection eliminates most of the possibility of infestation in man with this parasite in meat from inspected plants. However, it is never a safe policy to eat raw meat. Remember, one-third of it is uninspected.

There is another tapeworm capable of infesting man. Its cystic stage is in fish. It may also infest dogs and other carnivora. This tapeworm may acquire a length of 30 feet and is provided with suckers and no hooklets.

Parasites Indirectly Injurious

Some parasites may become injurious to man only indirectly. In this group we have the echinococci. This parasite produces cysts seen most frequently in the livers of hogs and cattle and possibly sheep, but may be found in any of the tissues of the body. These cysts are bladder-like, having within them the heads of parasites which when consumed by dogs result in infestation of the dog with *Taenia echinococci.* This parasite is very rarely encountered in the United States. We have not recognized it in post-mortem examinations of 6,000 dogs, since it is only three segments about one-third of an inch long and could easily have been overlooked. Packing house reports are, that it is not very common, but may be encountered in the Southwest. The danger in this parasite is that man, as well as cattle and hogs, may develop the cyst by association with dogs which are infested with tapeworm.

In conclusion it may be repeated that we have a remarkable system of meat inspection in operation under the U. S. Bureau of Animal Industry, which takes care of two-thirds of our meat food products. The unfortunate part is that the states and many of the cities, particularly the smaller ones, are making no attempt at a scientific control of such food products. The veterinary profession should be ever mindful of this and endeavor to educate the public to demand an adequate veterinary inspection of meat food products.

Diarrheic Diseases of Adult Cattle*

By R. A. McINTOSH, Guelph, Ontario

The use of the word adult in the title of this article is to eliminate from consideration those forms of diarrhea that are peculiar to calves; confining it to those which are more often encountered in older animals, although not entirely confined to mature animals. It is not intended to give very much detail regarding the various forms of the disease but rather to reveal in a general outline the many causes and factors responsible for these conditions.

In a broad manner the diarrheic diseases of mature cattle may be classified into those of an infectious origin, due to a specific etiological factor, and those of a sporadic nature which occur from a number of causes. Under the infectious group may be listed Johne's disease or chronic specific enteritis of cattle, coccidiosis or red dysentery of cattle, winter dysentery of cattle, and possibly malignant catarrh. All of these diseases are primarily associated with an enteritis except malignant catarrh in which the inflammatory reaction originates in the mucous membranes of the head, but frequently extends to the stomach and intestines, giving rise to a diarrhea.

Johne's Disease

Johne's disease is a chronic infectious disease of cattle caused by the *Mycobacterium paratuberculosis,* an acid-fast rod-shaped organism similar in appearance to the tubercle bacillus. This organism is difficult to culture and aberrant strains are frequently observed. According to some workers there appears to be a close relationship between this organism and the avian tubercle bacillus. The fact that avian tuberculin may be used as a diagnostic agent for Johne's disease is significant of some definite relationship between these two organisms.

The disease is highly fatal and is characterized by a chronic and persistent diarrhea and a progressive loss of flesh. Natural infection undoubtedly takes place through the digestive tract as a result of the consumption of contaminated food or water. In the animal body the habitat of the organism is in the diseased intestinal mucosa and the associated mesenteric lymph glands. In the diseased areas of the gut it is found in large numbers where it shows a tendency to clump. Microscopically the tissue reaction is somewhat similar to that occurring in tuberculosis but is without necrosis or caseation. Macroscopically the diseased gut appears enormously thickened and in long standing cases is of a dark, greyish color with a milky, mucoid exudate over its surface. The cecal mucosa usually shows the more gross lesions.

The disease is quite prevalent in European countries, including Great Britain and the Channel Islands. In the United States it is increasing in prevalence and to a lesser degree this is true in Canada also. In its nature the disease is very insidious for many months, even years may elapse between the time of infection and the obvious manifestation of it. The insidious character and chronicity of the disease favor the spread of the infection for carrier animals may be bought and sold, and transported from one herd to another without those concerned in the transaction having any knowledge of the fact that such an animal is a source of danger to the other members of the herd in which it may be placed.

Because many cases appear in relatively young cows, it is felt that in many instances the affected animals contract the infection while quite young (as calves). The first distinctive symptom is a chronic diarrhea or repeated periodic attacks of it. On occasions during the latter stages of pregnancy the diarrheic condition disappears somewhat, only to be followed by a more violent manifestation after parturition. There is no fever, the appetite usually remains good, but there is an increasing emaciation finally terminating in anemia and cachexia.

The diagnosis of the disease in its later stages may be accomplished by clinical

* Presented at the 10th Veterinary Conference of the College of Veterinary Medicine, The Ohio State University, Columbus, O., June 16-18, 1937.

observation. In some instances a microscopic examination of stained smears of scrapings from the rectal mucosa, in which clumps of the acid-fast bacilli may be found, is necessary. There are also allergic tests for the disease. Johnin and a specially prepared avian tuberculin are the reagents used for this purpose. They serve to substantiate a clinical diagnosis and as well aid in differentiation from other diarrheic diseases.

Coccidiosis

Coccidiosis is a specific hemorrhagic enteritis of cattle affecting the rectum and to some extent the colon and cecum. It is caused by the *Coccidium* (*Eimeria*) *Zurnii* and manifested clinically by diarrheic evacuations containing blood clots. Coccidiosis is common in Switzerland and quite prevalent in some other European countries. It has been reported in widely separated parts of the United States, but only on a few occasions in Canada.

The adult parasite lives in the epithelium of the rectum where it undergoes an elaborate metamorphosis resulting in the liberation of a large number of oöcysts—the immature form. These are carried out with the fecal discharges and contaminate the food and water of other animals. They may remain in stagnant pools of water or in grasses for months and it is in such places that cattle most frequently become infected. Wet years favor the occurrence of the disease. It is rarely observed in calves under six months of age and not often in cattle over two years of age.

The period of incubation in this disease is from one to three weeks. Milder cases manifest a blood-stained diarrhea and if milking, the secretion is decreased. In more severe cases a rapid loss of condition and weakness are observed. Peristalsis is markedly increased at first but later the bowel may become paralyzed, the anus remain open and the discharges and blood dribble away. The rectum is thickened, congested and wrinkled.

The course of the disease is from one to two weeks, although in severe attacks animals may succumb in a few days. As a rule the mortality is low. In the clinical diagnosis of the disease the most significant features are the diarrhea with blood clots and the fact that young cattle are most commonly affected. Confirmation of the clinical findings may be made by the use of microscope with which the oöcysts may be found in smears of the fecal evacuations.

Winter Dysentery

Winter dysentery of cattle is an enzoötic disease, diarrheic in nature, occurring in stabled cattle during the colder seasons of the year. Most cases do not pass beyond an acute intestinal catarrh, although in occasional individual animals a deeper-seated enteritis may develop and terminate fatally.

The cause of the disease is not definitely known although Jones and Little found a vibrio (*Vibrio jejuni*) responsible. Schofield, of the Ontario Veterinary College, found a vibrio in two out of six fecal samples. He was able to reproduce the disease in two cows by drenching them with aqueous suspensions of the feces of affected animals, but was unable to produce the disease in another cow with a fecal suspension from a recovered case. With the small number of animals he had Schofield also tried to determine if a virus was the causative agent. This was done by the intravenous administration of a fecal filtrate which did not produce the disease.

The period of incubation is from three to ten days. The disease is sudden in its onset and as a rule many members of the herd are affected at the same time. A marked diarrhea occurs containing mucus and blood. The appetite is affected somewhat and a drop in the milk secretion of lactating cows is observed. Affected animals are listless and gaunt quickly. Recovery takes place in from three to six days. There is not any marked constitutional reaction except in serious cases.

Some winters the disease is quite prevalent, occurring over considerable areas of the country, but on other occasions only an occasional herd or a number of herds in a district may be reported.

The diagnosis of winter dysentery is based on the time of the year it occurs, the fact that whole herds are affected, its mild

character, spontaneous recovery and low mortality.

Malignant Catarrh

Malignant catarrh is not primarily a diarrheic disease because in the initial stages there is usually a violent inflammation of the mucous membranes of the eyes and nose. This inflammatory reaction may spread into the bronchial tubes or involve the gastro-intestinal tract. Quite often it does the latter and results in a diarrhea.

This again is a disease which is far more prevalent in Europe than in America, although a few outbreaks of it have been reported in Ontario. In Europe it is now believed to be caused by a virus. It does not, however, appear to be highly contagious, for cases may occur in a herd without all of the cattle becoming infected.

The initial symptoms are lacrymation, a nasal discharge, high temperature, a loss of appetite and depression. There is a tendency to the formation of croupous membranes on the mucous membranes involved and, if the respiratory tract is affected, difficult breathing is seen, but if the stomach and intestines are involved, a diarrhea occurs. The mortality is high. Diagnosis is based on the acuteness of the disease, the marked depression and the presence of croupous exudate in the nares and other affected parts.

The accompanying table will facilitate comparison and differentiation of these four diseases.

Sporadic Diarrhea

The sporadic forms of diarrhea are many and varied in their causes. They may be acute or chronic in character. The chronic types of the sporadic form are usually due to some condition which interferes with rumination. Inability to ruminate may give rise to symptoms other than diarrhea, but if the condition persists long enough and the animal continues to eat, sooner or later diarrhea appears. This occurs because the food is not properly masticated and passes into the true stomach and intestines in a coarse form. The rough, improperly masticated food irritates the gut and diarrhea follows.

There are a number of conditions which interfere with rumination. Among them are dental irregularities. Dental troubles are not very common in cattle, but they do occur and will terminate in digestive dis-

COMPARATIVE DATA

	Johne's Disease	*Coccidiosis*	*Winter Dysentery*	*Malignant Catarrh*
Cause	Johne's bacillus	*Eimeria Zurnii*	*Vibrio jejuni*	A virus
Incubation	½-2 years	1-3 weeks	3-10 days	17 days—4-8 weeks
Season	Any time	Spring & fall	Winter	Any time
Course	Insidious, chronic	1-2 weeks	3-6 days	3-7 days
Age	2-6 years	6 mons.-2 years	Any age	Any age
Site	Intestinal tract	Large intestines	Intestinal tract	Stomach and intestines
Onset	Gradual	Sudden	Sudden	Sudden
Anorexia	Appetite fair	Moderate	Moderate	Marked
Loss of flesh	Gradual	Rapid	Moderate	Rapid
Temperature	Normal	Slight rise	Slight rise	Very high
Diarrhea	Severe, persistent	Violent, blood clots	Marked, mucus, blood	Severe, blood stained
Depression	Slight	Varies	Moderate	Marked
Mortality	High	Low to 50%	Low	Very high
Diagnosis	Clinical, Johnin test	Clinical, microscopic	Clinical	Clinical
Differential	Chronicity & tests	Blood clots & microscopic	Season & character of disease	Temperature, croupous exudate & severity
Prognosis	Unfavorable	Guarded	Favorable	Unfavorable

turbances of this nature. One of the worst cases of chronic persistent diarrhea the writer ever observed was in a Jersey cow with last two molars on the upper arcade both loose. An examination of cases of this kind is not complete without taking the teeth into consideration.

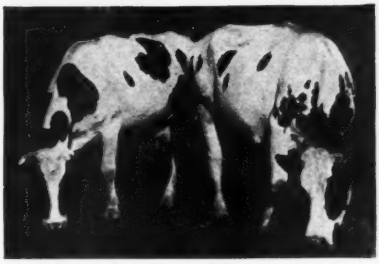
Tumorous enlargements along the course of the esophagus may interfere with rumination. These may be abscesses, actinomycotic growths or lymphatic tumification. They may occur in the region of the throat, in the mediastinal lymph glands or at the reticular orifice of the gullet.

Other interferences with rumination arise from reticular and biliary complications. A traumatic puncture of the reticulum may result in an adhesion which prevents the regurgitation of food and rumination. Abscess formation and enlargement of the liver may distort the position of the esophageal groove and prevent rumination.

While the foregoing illustrations referable to rumination are not primarily diarrheic diseases they serve to reveal the many complications and lesions which lead to gastrointestinal irritation. Quite often the veterinarian is not consulted regarding these cases until the digestive derangement has become chronic and he may have to search for just such abnormalities before he can determine the cause.

The acute types of the sporadic forms of diarrhea are for the greater part due to a gastroenteritis and they are usually of a serious nature. There are a number of causes which may be placed under different headings. There are toxic etiological factors such as lead and arsenic. These metallic poisons give rise to violent diarrheas. There are also parasitic infestations such as the stomach worm in young cattle. While diarrheas occurring as a result of parasitism are not common in this country, nevertheless, outbreaks of this nature do occur.

Finally, there are dietetic causes and this is the acute form which is probably most frequently encountered. It occurs with greater frequency during the colder seasons of the year while cattle are stable fed. Dietetic forms of the disease arise from eating spoiled and damaged food, such as grass that has been repeatedly frozen, badly cured hay or roughage, moldy corn or silage, rotting feed. Sudden changes in the character of the diet may cause it as may also an over-feed of concentrates and



overfeeding at the conclusion of shipment after having been sparingly fed. Numbers of a herd may be affected similarly from a common cause. Undoubtedly infection enters as a secondary causative factor in many instances.

In this type of the disease the onset is variable. Young and pampered animals react more rapidly to the pathogenicity of the condition than do mature animals. Often a degree of indisposition is noticed for two or three days. When the symptoms are manifest it is observed that such animals are often recumbent. They may rise quickly but appear weak. Persistent pain is manifested by cautious movements, an expiratory grunt and switching. The eyes are sunken, the conjunctivae icteric and the eyelids swollen. The surface of the body and the extremities feel cold. Fever is not often present but chilling may be observed. There is marked depression, a fast pulse and shallow, quick breathing. In some instances grinding the teeth, delirium and convulsions are seen. The digestive symptoms are a complete loss of appetite, gauntness and frequent evacuations of watery feces. In some cases large amounts of mucus accompany the fecal discharges. If no improvement occurs there is ultimately a paralysis of the intestines and a profound toxemia. In from two to four days after the disease is established the patient is either on the mend or becoming moribund. The prognosis should be guarded but is more favor-

able in those patients which show an inclination to eat.

Treatment

The purpose of this article is to discuss the many different causes from which diarrheic disturbances in cattle originate. Practitioners who probably will be most interested in the subject may find it of value in diagnosis and at least it will serve to stimulate their search for causes in obscure cases. No mention of treatment has been made. It is obvious that in some instances treatment is of no avail. In other instances the success of treatment will depend upon the removal of the cause. It is felt, however, that an outline of treatment for the dietetic form of the disease may be of value for the suggestions submitted may serve as a guide in handling cases of gastrointestinal irritation.

The first indication for treatment is nursing hygiene which includes the selection of suitable quarters, the comfort of the patient, and in the colder seasons of the year, warmth. It is important that patients suffering from acute disturbances of this nature receive the best of care.

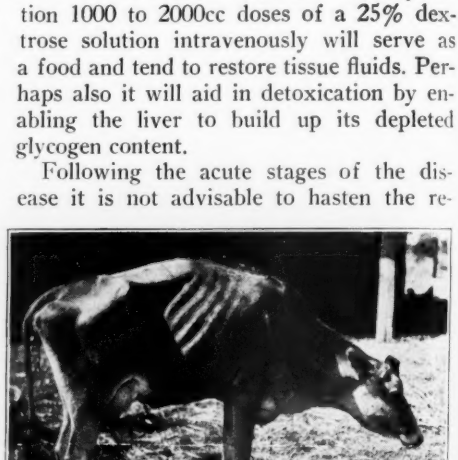
The second indication is the removal of the irritating intestinal content. For this purpose mineral oil and castor oil in equal parts and in 1½ to 2-pint doses is probably the most acceptable evacuant. It should be remembered that the gut is already in a state of irritation and under these circumstances mechanical evacuants are preferred. In addition to emptying the gut, mineral oil sooths and protects the mucous membrane and tends to inhibit bacterial growth. Pint doses may be continued daily if it is thought necessary.

The third consideration in treatment is to control fermentation and for this purpose intestinal antiseptics and antacids are indicated. Such agents as creolin, sodium bicarbonate, lime water and the sulphocarbolates may be used.

The fourth feature of gastrointestinal irritation which should be taken care of is to protect the irritated and inflamed mucous membrane. Such agents as bismuth subnitrate, tannic acid, and opium are of value in this regard. Bismuth subnitrate may be given in from two to four-ounce doses in a quart of milk, tannic acid in ounce doses.

Throughout the course of this disease there is intoxication and debility to combat for which camphor, caffeine and strychnine are indicated. A quart of strong black coffee is stimulative and is more potent in this regard if given quite warm. In those cases where there is evidence of dehydration 1000 to 2000cc doses of a 25% dextrose solution intravenously will serve as a food and tend to restore tissue fluids. Perhaps also it will aid in detoxication by enabling the liver to build up its depleted glycogen content.

Following the acute stages of the disease it is not advisable to hasten the resumption of the regular diet. This should be gradually accomplished. In some instances patients are slow in regaining their appetite and they may continue to be somewhat diarrheic. Should this occur, a mixture containing two fluid ounces of liquor strychnine, four fluid ounces of the elixir of lactated pepsin and ten fluid ounces of dilute hydrochloric acid should be supplied and given in ounce doses three times a day. On the other hand, if they remain dull and show a tendency to become constipated use nux vomica, ginger and Carlsbad salts.



In conclusion it is admitted that diarrheic disturbances may and do occur from causes other than those cited. In some instances it requires considerable diagnostic ability to determine the cause. The writer sincerely hopes that the suggestions contained herein may help some over problems of this nature.

Drugs Used in Veterinary Medicine

VIII. THE LOCAL ANESTHETICS

By VICTOR LEWITUS, New York City

Historical Sketch

No intelligent person can doubt the value of agents which promote insensibility to pain, i.e., the anesthetics. This applies to the practice of medicine among the lower animals equally as much as in the treatment of human beings.

There can be no doubt that man, very early in his career on this earth, met with the vicissitudes of pain. The writings of antiquity disclose the efforts made to lessen human suffering. Hippocrates once remarked, "Divine is the work to relieve pain." And the Odyssey mentions the "sorrow-easing drug"; very likely referring to the narcotic juice of the opium poppy. During the siege of Troy the Greek surgeons used anodyne applications to relieve their wounded warriors.

Primitive tribes realized the advantages of cold compresses, and even the beneficial effects of pressure on a part, although they did not understand how it worked. Even now, certain tribes apply pressure over the carotid arteries in surgical operations, such as circumcisions. The Russians have nicknamed the carotid "the artery of sleep."

The Egyptians also knew the uses of the milky exudate of the poppy, as well as the virtues(?) of Indian hemp, or cannabis plant. They also used a magical stone (undoubtedly a carbonaceous rock) which was applied to the wound, with wine. This treatment, however, was usually accompanied by draughts of some narcotic or other strong beverage, so qualities were attributed to the mystical stone which it did not possess.

The Chinese tribes not only knew the action of the poppy, but also the value of henbane and (mistakenly) the Mandragora plant. In fact, they often paid tribute with them in place of money. So strongly traditional was their attachment to these drugs that even when chloroform became accepted as an anesthetic, they did not adopt it for many years.

Thomas Bartholinus first introduced the use of freezing agents for anesthetic purposes in the middle of the sixteenth century. He had observed that both ice and snow have marked local effects. This observation was, indeed, the forerunner of our present day ethyl-chloride spray method, or modern means of applying carbon-dioxide snow.

With the discovery of the hypodermic syringe in 1845 by Rynd of Edinburgh, a revolutionary change took place. Though opium and morphine were employed, and the effects were due to their general, instead of local action, nevertheless numerous operations were performed with their help. The "needle method" was attempted even with chloroform, but it was soon abandoned as too irritant.

In about this same period general anesthesia came into use in medicine. Contrary to expectation, however, it helped further increase interest in the progress of local anesthesia. Explorers of the South American continent observed that the natives—especially those who served as messengers in the high altitudes of the Andes—habitually chewed certain fresh green leaves. This habit enabled them to carry superhuman loads over many miles of difficult highways for many days without food. This observation led medical explorers to study the plant's properties. The active principle of the coca plant, technically known as *Erythroxylon coca,* was isolated by Godeke in 1855, and not long afterward Niemann called the alkaloid cocaine. Although Scherzir had earlier reported anesthesia of the tongue from chewing the leaves, Bennet in 1874 demonstrated that cocaine possesses anesthetic properties. It was Van Erp who discovered (1879) its powerful, lasting qualities; and Coupard and Borderon in 1880 found it excellent as an ophthalmic anesthetic in topical application. Shortly afterward, Karl Koller determined that a 2% solution is adequate on accessible mucous membranes. This greatly augmented its universal adoption.

We should not be surprised at the virtues exhibited by this wonderful drug, for history records the early worship of coca by the Inca tribes. These ancient Peruvians used to practice trephining; removing a rather large portion of the skull with a sharp piece of obsidian (hard, black volcanic glass). Since an estimated 2% or more of the population was thus treated (or mutilated), perhaps in the belief that it would permit the escape of some disease demon from the victim, it has been taken for granted by most authorities that "the divine plant of the Incas" must have been used as a local anesthetic. How else could they withstand such agony? Records indicate that either an infusion or the crushed leaves themselves were placed upon the freshly-scraped bone to deaden pain—the birth of local anesthesia occurring some 6000-odd years ago!

General Considerations

The ideal local anesthetic must meet the following requirements:

1. It must exert a specific action upon sensory nerve endings, paralyzing them at concentrations not harmful to the surrounding tissues.
2. The drug must be non-irritant, paralyzing the nerve ends without previous excitation.
3. The anesthesia should last for an optimum period of time—usually over a half hour.
4. The drug must be readily soluble in water and must be sterilizable by boiling.
5. The drug should not exert central toxic effects once it is absorbed or injected in local areas.
6. The drug should be compatible with epinephrine or adrenalin.

Most of the present-day local anesthetics are deficient in one or more of the foregoing ideals. For example, cocaine is well known for the central toxic action that it manifests once it is in the general circulation. Quinine and urea have marked toxic effect on the surrounding local areas. All the local anesthetics are relatively stable except cocaine, which is easily destroyed by boiling. Most anesthetics are readily soluble in water, except a few such as orthoform and anesthesin, which are insoluble, but nevertheless have special uses and advantages. Of course, such drugs cannot be injected and are intended to be used as dusting powders or in ointments.

The chief points to consider are:

a. The degree of local irritation produced.
b. The ease of penetration through mucous membranes.
c. The readiness with which they produce central toxic effects.
d. The period of anesthesia or lasting qualities of the anesthetic.

Cocaine ($C_{17}H_{21}O_4N$).—This is the alkaloid obtained from the leaves of *Erythroxylon coca*. It is official in the U. S. P. The drug occurs as large, colorless prisms, or a white powder, slightly bitter, producing temporary numbness on the tongue. It is only slightly soluble in water (1:600), freely so in alcohol, fixed oils, and liquid petrolatum, but insoluble in lard or petrolatum itself. Because of its poor solubility, cocaine is not used as much as its salts.

Cocaine Hydrochloride ($C_{17}H_{21}O_4N$·HCl).—This salt of cocaine is a white crystalline powder or colorless crystal. It is very soluble in water, and freely so in alcohol. It is incompatible with alkalies and sodium borate. Both cocaine and cocaine hydrochloride solutions when old or upon boiling are partly decomposed by hydrolysis, forming ecgonine, benzoic acid and methyl alcohol. When solutions are sterilized, there is always some loss. The amount, however, is not significant.

Applied locally, cocaine has practically no action on the unbroken skin, although it does penetrate to some degree if the part has been soaked previously. On other surfaces, cocaine paralyzes the sensory nerve-ends with a consequent loss of sensation. On the tongue, the perception of pain is cut off, but taste is only partially influenced. It must be pointed out that this active drug causes permanent effects by inhibition, or even destruction of nerve fibers. Besides the anesthesia thus produced, cocaine constricts the blood vessels. This is not well understood. Applied to the eye, it causes a mydriatic effect, due probably to the stimulation of the dilator mechanism. In this respect it is not as powerful as belladonna or atropine or

near relatives of the former. The action appears to be peripheral. The effect lasts several hours. No paralysis of accommodation occurs. For bloodless operations, cocaine solutions are sponged on the eye, ear, nostrils and throat or instilled into or injected beneath the conjunctiva. Used alone, the effects of cocaine are briefer than when it is combined with epinephrine (adrenalin). [Epinephrine extends the period of anesthesia considerably (for an hour or more) because of its constricting effect on the blood vessels, even in concentrations as low as 1:50,000.] Applied to the urethra, bladder or vagina, it will allay irritation and pain, though at first it may be slightly irritant. In congestive conditions of the nasal passages, it acts as a pseudo-astringent. For pruritic cases, it also gives relief as an anodyne. It is sometimes used to reduce nausea or vomiting in animals, though because of its central action it sometimes induces vomiting after it has been absorbed. Larger doses may paralyze the peristaltic functions, causing constipation. Whether due to absorption from the mucous membranes or to injections, cocaine has a peculiar narcotic effect upon the nervous system. Animals under its influence are exhilarated for extended periods, increasing their endurance and allowing the performace of abnormal feats. Witness the illegal and illegitimate use of cocaine in racehorses.

For ordinary analgesic effects, cocaine is used in strengths of 0.5 to 2%, but for complete local anesthesia, 4 to 5% solutions are usually required. The addition of a 1:20,000 epinephrine solution enhances this effect. In the eye, a 2% solution is often sufficient. Subcutaneously, it is injected around the field of operation by infiltrations, in the form of a circle or oval. These injections should be shallow, except for a few that should penetrate into the deeper tissues. Conduction anesthesia, as well as epidural anesthesia is often used in administering cocaine. The technique, which must be observed cautiously, will not be discussed here.

Because of its powerful action and lasting properties, as well as because it is a vasoconstrictor, cocaine is undoubtedly the local anesthetic par excellence. However, because of certain disadvantages such as instability, sudden toxic effects and narcotic properties, certain synthetic substitutes are generally preferable. Most of them have been patterned, chemically and pharmacologically, after cocaine.

Procaine Hydrochloride (novocaine or procaine) is chemically para-aminobenzoyldiethylaminoethanol hydrochloride. It has the formula $(C_6H_4(NH_2)(CO{\cdot}O){\cdot}CH_2N(C_2H_5)_2).HCl$. It occurs as fine colorless needles or white, crystalline powder, freely soluble in water and also soluble in alcohol. This local anesthetic is one of the most popular of the cocaine substitutes. It is synthetic in origin and has properties similar to those of cocaine, except that it is much less toxic (about 1/5 to 1/8, according to various estimates); it does not constrict the blood vessels (therefore always requires the addition of adrenalin); it is relatively ineffective when applied to intact mucous membranes (therefore is ordinarily injected); nor is its action as powerful or prompt as that of cocaine. It must not be concluded that procaine is non-toxic, for it is not unattended by danger. Procaine is less irritant to the tissues than cocaine, as are most of the other synthetics. For subcutaneous injections, the 1 or 2% solution is indicated; for ocular instillation, 5 to 10% solutions are practical. In diagnosing lameness in the horse, a few cubic centimeters of a 3% solution injected over the nerve on either side of the leg is sufficient. All these solutions should include epinephrine or adrenalin in amounts varying with the volume of liquid. The content of adrenalin must be carefully gauged, since accidents have occurred, not so much from the procaine as from the vasoconstricting agent itself. For large volumes, the adrenalin content must be kept down to less than a concentration of 1:250,000. When smaller areas are involved, and the total volume is much reduced, the adrenalin content may be stepped up accordingly. Procaine solutions are stable and may be boiled repeatedly without destruction. The drug is official in the U.S.P. Procaine nitrate and procaine borate are unofficial salts of procaine. The reports on procaine borate are not uniform,

but the action of both compounds is equivalent to that of procaine.

Procaine Benzoate is similar in properties to procaine hydrochloride. However, it is said to be about 20% less toxic. Known as aminocaine, it is used just as is procaine hydrochloride.

Procaine Butyrate is also similar to procaine hydrochloride. It is more rapid and powerful and somewhat longer-lasting than procaine hydrochloride. Its toxicity is claimed as slightly less than that of the benzoate.

Phenacaine Hydrochloride (holocaine) is chemically the hydrochloride of ethenyl-para-diethoxydiphenylamidine. It has the formula $C_{18}H_2N_2O_2.HCl.H_2O$, and is an official synthetic compound. The drug consists of small, colorless crystals, stable in air, odorless, with a slightly bitter taste, producing numbness of the tongue. It is partly soluble in water, freely so in alcohol and chloroform, and insoluble in ether. When boiled in the presence of alkalies (even in glass), aqueous solutions may become turbid. On standing, solutions do not decompose; they are in themselves antiseptic.

This local anesthetic is used mainly for ophthalmic work. Its effects are induced more promptly than those of cocaine, and it produces a comparable degree of smarting. Five minims of a 1% solution instilled into the eye causes an anesthesia lasting from one to ten minutes. It is much more toxic than cocaine; intravenously 50% more toxic for cats. For this reason, the drug is limited in its use to the eye.

Butyn (butyn sulphate) is chemically para-amino-benzoyl-gamma-dinormalbutyl-aminopropanol sulphate. $(NH_2{\cdot}C_6H_4{\cdot}COO{\cdot}(CH_2)_3{\cdot}N(C_4H_9)_2)_2{\cdot}H_2SO_4$. Colorless, odorless, solid, rapidly producing a sense of numbness on the tongue, this drug is slowly soluble in cold water but more so in hot water. It is soluble in warm alcohol and acetone, slightly so in chloroform, and insoluble in ether. It is incompatible with alkalies and should not be mixed with them. Butyn is proposed as a local anesthetic in place of cocaine and novocaine. It is of especial value in surface work, such as the eye, nasal passages and throat, for it is considered to act as powerfully on intact mucous membranes as does cocaine (which novocaine does not). On the normal eye, it has been found just as effective as phenacaine and more effective than cocaine or eucaine. The application of butyn to the eye often produces congestion of the conjunctiva, but this is not significant. In albino rats, the hypodermic injection of the drug indicates its toxicity to be about 2½ times greater than cocaine; the lethal dose (measured by intravenous route in cats) shows it to be equally as toxic as cocaine. Experiments thus far indicate butyn to be an efficient substitute for cocaine for surface anesthesia of mucous membranes. It may even be superior, especially in the eye, since it can be used at much lower concentrations because of its prompt absorption. However, for injection, including spinal anesthesia, it should not replace procaine because of the great toxicity when so used. For injections, it is recommended in 0.1 to 0.4% solutions. A recent authoritative medical committee reports that butyn is more powerful, more rapid and more prolonged in its action than cocaine. Furthermore, in ocular, nasal and throat operations it does not change the size of the pupil, dehydrate the tissue, nor produce an ischemia. For topical applications the drug is recommended in 2% strength. In one minute, a single application allows removal of foreign bodies from the eye and application of irritant astringents. Four instillations, three minutes apart, permit operative work within five minutes after the last instillation, allowing operations of the commoner type on the eye. Solutions may be sterilized by boiling.

Metycaine (metycaine hydrochloride) is chemically benzoyl-(2-methylpiperidino)-propanol hydrochloride. It has the formula: $C_6H_4{\cdot}COO(CH_2)_3{\cdot}NC_6H_{12}{\cdot}HCl$. This local anesthetic is a recent addition to our medicaments. It produces prompt effects when applied topically to mucous membranes or injected subcutaneously. Recent studies indicate that subcutaneously it is less toxic than cocaine, resembling procaine. Intravenously, it is about three times more toxic

than procaine. For the eye, it is recommended in 2%; for nasal and throat applications 2 to 10%; for urethral anesthesia, 1 to 4%; and for infiltration in small areas, 0.5 to 1% solutions. The drug consists of fine, white, crystalline powder, odorless and slightly bitter, followed by numbness when tasted. It is permanent in air; freely soluble in water, and soluble in alcohol and chloroform. It is faintly acid in solutions, and incompatible with alkalies.

Tutocaine (tutocaine hydrochloride or butamin) is chemically para-amino-benzoyl-dimethylaminomethyl-butanol hydrochloride: $(CH_3)_2N{\cdot}CH_2{\cdot}CH(CH_3)CH(CH_3){\cdot}(COO{\cdot}C_6H_4{\cdot}NH_2)HCl$. This drug is a light, ivory-colored, crystalline powder; odorless, bitter and stable in air. It is soluble in water and slightly so in alcohol. It is incompatible with alkalies, and is used for surface as well as subcutaneous methods of application. Properly used, it produces rapid, complete and prolonged anesthesia, being effective in relatively low concentrations. In the strength of 0.25 to 1% solutions, it induces complete anesthesia of the cornea in about four minutes. In surface work, it is more tardy than cocaine, but equally as powerful. Injection methods are very prompt in securing results. Injection of 1% solutions anesthetize the area for 15 to 20 minutes. With small dilutions of adrenalin, the period of anesthesia is greatly extended. It has been observed, that a 3% solution injected intravenously in cats proves to be about four times as toxic as procaine. It is considered relatively safe in surface and hypodermic injections. Solutions of tutocaine may be sterilized without harming them, by boiling.

Diothane Hydrochloride (diothane) is chemically piperidino-propanediol-di-phenylurethane hydrochloride. The formula is: $C_5H_{10}N{\cdot}CH_2{\cdot}CH(COONHC_6H_5)\ CH_2{\cdot}(COONHC_6H_5){\cdot}HCl$. This drug is similar in properties to tutocaine. It is slightly soluble in water; freely soluble in alcohol. It is slightly acid in solution and incompatible with alkalies. Its solutions must be used promptly; they become alkaline on standing and are subject to precipitation. In action and use it resembles cocaine, but it is said to produce a longer-lasting anesthesia. It is three times as toxic as procaine in intravenous injections, and for this reason can be used only with caution and in small doses where absorption into the general circulation is probable. Its slowness of onset (about a half-hour) is one of its greatest disadvantages. It is used in 1% solutions and ointments.

Nupercaine (nupercaine hydrochloride or butyloxycinchoninic acid—diethylethylenediamide hydrochloride).—Nupercaine is an extremely powerful local anesthetic, its anesthetic power being much more prolonged and much greater than is the case of either cocaine or procaine. However, with this advantage, is the great disadvantage of toxicity (see table) for it is at least five times as toxic as cocaine when injected intravenously. In the comparative tables it is ranged topmost in point of danger as regards present-day, local anesthetics.

Larocaine Hydrochloride (diethylamino-beta-beta-dimethylpropyl-para-amino-benzoate hydrochloride).—This drug serves as a surface as well as a conduction (infiltration) anesthetic and compares quite favorably with cocaine or procaine. It is prompt in action and furnishes a longer lasting effect (averaging three to five hours). It is not narcotic in properties. Solutions may be boiled, but epinephrine should be added just before using. It must be kept in dark bottles, since it is sensitive to light. For corneal or conjunctival anesthesia 2 to 5% solutions are recommended; for ear and nasal and throat work 5 to 10%; for urologic practice, 0.75 to 1%; for conduction anesthesia (infiltration), 0.25 to 2%.

Tropacocaine was at one time popular. A naturally occurring alkaloid (benzoyl-pseudo-cocaine), it is closely allied to cocaine, but may be made synthetically. It resembles cocaine but does not dilate the pupil nor constrict the blood vessels when applied topically. It is more toxic than cocaine and much more toxic than procaine when intravenously injected, which has caused its disuse. It possesses no real advantages over other agents of this class.

Quinine & Urea Hydrochloride.—This compound of quinine hydrochloride and urea hydrochloride contains about 61% of

anhydrous quinine. This occurs as colorless, translucent crystals or a white powder, odorless, with a bitter taste. It is very soluble in water and freely so in alcohol. By hypodermic injection it produces a much more prolonged anesthesia than cocaine. This may continue up to several days. If strong solutions are injected, sufficient irritation will be produced to cause fibrosis and necrosis. On mucous membranes, applications range in strength from 10 to 20%. For injections hypodermically, the range recommended is from 0.25 to 1% (some have suggested 2 to 4% for animals, but the lower limit is prescribed here). This dilution will usually avoid the production of fibrous indurations. Intravenous solutions appear to be too dangerous, since the quinine salts are known to cause a fall in blood pressure. Furthermore, quinine is a protoplasmic poison and must not be injected near important nerve trunks at any time.

Apothesine is diethylaminopropyl cinnamate hydrochloride. Like procaine, it is efficient by injection but not suitable for surface work. Higher concentrations are required and the action is much slower, but anesthesia is just as complete as with novocaine. Toxicity is about that of cocaine. It is used in 0.5 to 2% solutions and may be sterilized by boiling.

Alypine is 2-benzoxy 2-dimethylaminomethyl 1-dimethylaminobutane hydrochloride. It is recommended in ophthalmic, nasal, throat, minor surgery and dental work in 0.5 to 10% strength, with epinephrine. Solutions do not affect the pupil or accomodation, and may be boiled. It is claimed to be less toxic than cocaine, but it is uncertain as to toxicity and is considered very irritant. It has special use in bladder and urethral treatment.

Stovaine is so irritant, and after-effects have been so often associated with it that it has become unpopular. Because of its unreliability it is not indicated in veterinary medicine.

Eucaine Hydrochloride is official. It is less toxic than cocaine but it is more irritant than cocaine and is incompatible with epinephrine. This has lead to its unpopularity. For the eye a 2 to 3% solution is used; and 5-10% on other mucous membranes.

Benzyl Alcohol (phenmethylol) C_6H_5-CH_2OH, is an aromatic alcohol occurring in certain balsams, and produced synthetically. It is a colorless, aromatic liquid, having a burning taste; soluble one part in 25 of water, and miscible with alcohol, ether and chloroform. It is used as a local anesthetic directly on the mucous membranes, or by injection. When properly used it is practically non-irritant and non-toxic. This liquid is recommended in 1 to 4% solutions in water or physiological saline solution. These may be sterilized by boiling. The pure drug is markedly antiseptic. The technic of injection is the same as for other such local agents. For pruritus it may be used in 10% ointments in lard, or as a lotion of equal parts of the drug, alcohol and water.

Insoluble Local Anesthetics

There are a few local anesthetics that are insoluble, and therefore are intended to be used locally only in the form of dusting powders or ointments. They must never be injected. These include:

Ethyl Aminobenzoate (benzocaine; anesthesin) U.S.P. $NH_2C_6H_4{\cdot}COO(C_2H_5)$. Used in strengths of 1 to 10% in powder or ointment form to allay pain in wounds, ulcers, burns, and to anesthetize mucous membranes, such as the alimentary tract.

Orthoform (methyl-amino-parahydroxy benzoate) $C_6H_3(NH_2)(OH)COOCH_3$. Similar to benzocaine, it is said to be more irritant, sometimes causing severe local injury, and is weaker than benzocaine.

Butesin (normal-butyl-para-aminobenzoate).—This drug is reputed to be stronger than either anesthesin or orthoform. Combined with picric acid to form butesin picrate, it serves as a germicidal local anesthetic. In a 1:1400 solution, it is efficient when used in the eye. Because of its antiseptic properties it is useful in treating burns and other painful lesions when there is danger of subsequent infection.

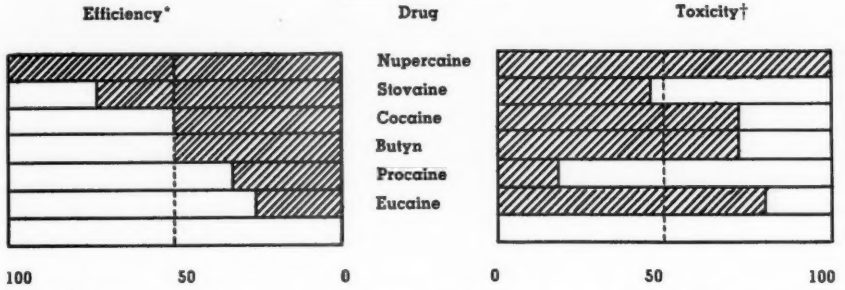
Toxicology

As a class, the local anesthetics are best represented by cocaine. The differences, when overdoses are administered, consist mainly of quantitative rather than qualitative considerations.

In the dog, moderate doses produce mental exhilaration, so that the animal will bark and jump about. There is usually restlessness, terror and rhythmical movement when a large dose is given. Slight noises frighten the animal and it becomes unfriendly, if it be naturally sociable. Later the opposite symptoms occur, and the dog will bark and lick the hand unhesitatingly. Later on, muscular twitchings, rhythmic movements, (pendulum swing) of the head, great weakness, convulsions, and finally stupor ensue. There is a feeble pulse and failing respiration. In horses, cocaine causes restlessness, muscular twitching, trembling, nodding and weaving of the head, dilated pupils and salivation. Later on the excitement intensifies and acute mania may follow. Three grains of cocaine subcutem have been known to produce this syndrome; more than six or seven grains is quite certain to produce it. Treatment in these cases consists of strychnine or atropine for circulatory or respiratory failure; ether inhalations for convulsions; and bromides or barbiturates for excessive excitement. In emergency, a soluble barbiturate may be injected intravenously. It must not be forgotten that epinephrine or adrenalin, used along with the local agents, is in itself a potent drug. In the dog, this drug has a minimum lethal dose of 0.1mgm per kilo intravenously, but the m.l.d. subcutem is 5mgm per kilo or 50 times as great.

TABLE OF EFFICIENCY AND TOXICITY OF CERTAIN LOCAL ANESTHETICS

(Modified after Clark)



**Efficiency* (as reciprocal of percentage concentration required to produce local anesthesia) after intracutaneous injections in man, or applications to rabbit's cornea.

†*Toxicity* (measured as reciprocal of the minimum lethal dose in grams per kilo) in dogs or cats injected intravenously.

EDITOR'S NOTE: This is eighth of a second series of articles by Professor Lewitus on Drugs used in Veterinary Medicine. The ninth discussion will appear in an early issue.

Parasite Control

It appears that the utilization of sunlight and heavy rains is important in parasite control. Most parasite eggs and larvae were found to die quickly in unshaded grassed areas, but disappeared sooner on bare soil partially shaded and even more rapidly on unshaded bare soil. Heavy rainfall clears the pasture areas of the eggs and larvae.—*E. S. R.* 76:848.

Improved Milk Awaits Convenience

At the training school for milk and dairy inspectors, sponsored by the Kansas Association of Milk Sanitarians, the State Board of Health and the Dairy Department of the Kansas State College, at Manhattan, Kansas, November 19-20, 1937 W. F. Lunsford, City Health Director of Kansas City, Kansas, stated that due to a lack of fall pasture for cows, the inauguration of the grading system for milk has been deferred.

Abstracts

Chemotherapy in Undulant Fever

The author[36] has observed cases of undulant fever (human) which were cured promptly by the internal administration of pyramidon and sulphate of chinoline. In a few days the temperature dropped and the duration of the disease was shortened to 10 to 20 days. He recommends the treatment highly to veterinarians exposed to Brucella infections.

Equine Brucellosis

Of nine horses, hospitalized at the veterinary school of Lyon for poll evil and fistulous withers, four reacted to the agglutination test. Three came from farms where Bang's diseases existed in the cows. The authors[37] declare that Brucella bursites do not suppurate until accidentally or surgically opened to the entrance of ambiant organisms. The authors warn against transforming such lesions from closed to open ones, as they may be cured without purulent complications.

Colic from Cold Draughts

The ingestion of cold water, cold milk, or other cold foods by calves and colts, and sometimes by cattle and horses causes considerable reduction of the internal temperature, to which especially the younger animals are very sensitive.[42] In calves the ingestion of cold liquids leads to paresis of the abomasum and inhibition of the intestinal peristalsis, resulting in colic. In the beginning the appetite is present, but later the thirst is increased. The principal symptom is a distension in the region of the abomasum and sensitiveness to pressure in that region. If medical aid does not intervene, the animal will die from the resulting intoxication and circulatory disturbances. A brief starvation period will relieve the lighter forms. Stimulation of diuresis by digitalis is indicated.

Skeletal Disease in a Dog

Clinical examination of a three-and-one-half-month old Scottish terrier revealed[41] enlargement of the skull, thickening of the upper and lower jaw, exophthalmus, anemia, increase of lymphocytes and polymorphonuclear leucocytes with a shift to the left, tendency to hemorrhage and accelerated sedimentation of the red blood cells. On this basis and the basis of roentgenological examination a diagnosis of ostitis fibrosa was arrived at.

Rate of Movement of Intestinal Contents

In order to check the time required for food to travel through the intestines, Roos and Koopman[45] added potato starch to the food. When meat was fed exclusively, the first starch granules appeared between three and one-half and seven and one-half hours, and the last starch granules five to five and one-half days after feeding. When bread, meat and milk were fed, starch granules were observed as early as three to four hours after feeding; the largest number, seven hours after feeding, and the last granules five to seven days after ingestion. When bread and milk were fed, the earliest starch granules were observed one and one-half to nine hours after feeding, the largest number four to nine hours after feeding.

Tuberculosis of the Penis in a Bull

Depending upon anatomical and histological considerations, tuberculosis of the penis may be classified into two groups[46] One group is composed of productive tubercles, the size of a lentil, forming beneath the epithelium of the visceral layer of the penis. These small tuberculomata are eas-

[36] Dolder, E. *Schweizer Archiv*, 78:9. Abs. *Revue de Pathologie Comparée*, June, 1937.
[37] Lasserre, R., and Labatut, R. La Brucellose equine dans la region toulousaine. Abs. *Revue de Pathologie Comparée*, 37:489, June, 1937.
[42] Toman, R. V. 1937. Atony of Stomach and Intestines in Large Animals (Trans. Title). *Tijdschr. v. Diergeneesk.* 64:217-220.
[41] Wirth, D. and Pommer, O. 1937. Osteodystrophia Fibrosa in a Dog (Trans. Title). *Wien. Tierarztl Monatsschr.* 24: 257-262.
[45] Roos, J. and Koopmann, S. 1937. Passage of Food Through the Gastrointestinal Tract of the Dog. (Trans. Title.) *Tijdschr. v. Diergeneesk.* 64:495-512.
[46] Dieter, R. 1937. Primary Penis Tuberculosis in a Bull. (Trans. Title.) *Tierarztl Rundsch.* 43:519-521.

ily overlooked, but they are important clinically, because bulls so affected are capable of infecting cows during mating by causing a primary tuberculosis of the vagina, from which metastases may form in the organs. The other group is formed by conglomerate tubercles, reaching the size of a fist and undergoing caseation necrosis. They are found in the region of the fundus, in the subcutis and cutis of the penis and prepuce.

Diseases of the Lachrymal Duct

Diseases of the lachrymal duct include tumors, stenosis, and obstruction of the duct. The symptoms are an abnormal overflow of tears down the cheek, often producing a catarrhal conjunctivitis, and a superficial keratitis. When the epiphora has persisted for some time, dacrocystitis will set in. Bolle [47] considers catarrhal dacrocystitis of rather frequent occurrence. Phlegmonous dacrocystitis is less common. Blepharitis angularis is almost a certain symptom of disease of the lachrymal duct.

Treatment consists in clearing the duct with a probe, and irrigation. If this treatment does not relieve the condition, the lachrymal duct within the lid sac is to be split open.

Treatment of Obstipation

When one explores, rectally, the location of constipation attention should be paid to the tenacious mucous upon the wall of the rectum.[48]

Therapy consists in giving copious amounts of lukewarm water to which sodium sulphate is added. To alleviate pain, belladonna extract (20 to 25gm) is administered. Other measures are withholding of food, and the application of warm bandages, or packs, to the abdomen.

If the constipation does not yield within 24 hours, one may give 20 liters of linseed tea to which sodium sulphate has been added. If this therapy does not bring the desired results on the third day, then a small amount of arecoline (0.04gm) is given. This usually exerts a prompt action upon the already prepared ingesta.

Cecal impaction may take an entire week's time for dissolution.

The best treatment of meteorism is by means of a trocar.

Papillomatosis in Dogs

Experience indicates that papillomata in dogs are contagious, but the etiology is still unknown. It is known that a certain relationship exists between inflammatory changes due to injuries and papillomata.

On the basis of his comparative histological studies Ajello [49] explains the histogenesis as a hypertrophy and hyperplasia of the papillary body. These lesions then produce papillomatous neoplasms. Ajello is inclined to believe that canker of the hoof, papilloma of the fetlock and papilloma of the dog are closely related etiologically, and perhaps are caused by a filterable virus.

Forms of Experimental Thyroid Insufficiency

Various circumstances modify the symptomatic expression of thyroid deficiency: age, sex, and species.[50]

Age.—It is only in the young that the symptomatology is complete. Often in the adult the thyroidectomy operation is well supported. Only a certain degree of apathy and indifference is noticeable, and these can be absent. It may require secondary conditions, such as exterior temperature, to make the depression more marked. Adler has observed that in hibernating animals the thyroid undergoes a temporary regression and that an injection of thyroid extract interrupts the hibernal sleep. High protein feeds augment the accidents; milk attenuates them. Alimentary deficiency also diminishes the troubles, whereas the use of vitamins increases them. Fasting permits the

[47] Bolle, W. 1937. Diseases of the Lachrymal Duct in Dogs and Their Treatment. (Trans. Title.) *Tierarztl Rundschau.* 43:569-571; 579-583.

[48] Beijers, J. A. 1937. Diagnosis and Therapy of Colic. (Trans. Title.) *Tijdschr. v. Diergeneest.* 64:459-467.

[49] Ajello, P. 1937. Multiple Papillomatosis on the Thigh of a Dog. (Trans. Title.) *Wien. Tierarztl Monatsschr.* 24:425-429.

[50] Prof. Dr. S. Abravanel Aysoy, (1937), of the Veterinary Faculty of Ankara. Section of an article entitled, "Effets de l'ablation de la glande thyroide sur le fonctionement du coeur et sur les secretions des autres glandes endocrines. (Effect of the ablation of the thyroid gland on the heart and upon other endocrine glands.) *Revue de Pathologie Comparee,* 37:488. Translated by L. A. Merillat.

animal to support ablation of the gland much better, and inversely, thyroidectomy attenuates the consequences of the inanition. This is easily understood, since the dog normally loses 0.478 grams of nitrogen daily at rest, while one thyroidectomized and fasted loses but 0.250 grams.

Among the circumstances which bring about these accidents one must include the various periods of genital life, particularly in the female, which is generally sterile when deprived of the thyroid gland. If gestation survives thyroidectomy, the young are habitually less numerous. Post partum, the abdominal hair does not grow, trophic ailments of the skin may appear, and the animal becomes cachectic and dies. Verstraeten and Vandenlinden cite the case of a cat that supported ablation of the thyroid well and became pregnant three years later. However, at term she had convulsions and coma and delivered dead fetuses, but survived, owing to injections of thyroid extract. Sometimes it is only in the course of lactation that troubles arise. A bitch thyroidectomized by Vassale went through a pregnancy that ended in the birth of two pups, which did not survive, and a second bitch gave birth to eight pups, of which only one died. However, in the course of the lactation, convulsions arose. In view of these facts it is reasonable to ask whether it was not the loss of the parathyroids, rather than the suppression of the thyroid that caused the convulsions. Thyroidectomized hens, according to Lanz, show nothing except the laying of small eggs, five grams instead of 50 grams. Thyroidectomized chickens (Ceni) lay but eight to ten eggs a season instead of 110 to 120, the normal figures. The shell is thin and may be absent. When bred, thyroidectomized hens show anomalies in the development of the embryos, even to the point of anencephalia.

Sex.—One can show that the various events of the genital life of thyroidectomized females can provoke accidents of thyroid insufficiency. According to Christiani, female rats do not support thyroidectomy as well as males. On the whole, all of the modifications of the deficiency syndrome are more intense in the female.

Species.—Whether or not the skin of thyroidectomized animals shows the presence of the infiltration, we call myxedema, there is a type of edema with turgescence that is frequent in the dog and swine and an atrophic type that has the aspect of the cretinism which is always seen in the cat, goat, and fowl. The larvae of batrachians thyroidectomized constantly show hindrance of metamorphosis (Hoskins and Schulze), although their growth is not entirely arrested. The animals remain larval, but enlarge, thanks no doubt to the thymus. A certain amount of acromegalia is observed as the result of compensatory hypertrophy of the pituitary (Hoskins). If the batrachian is thyroidectomized after metamorphosis, it grows on without the gland. The thyroid acts more to prepare for life than to realize it.

Translator's Comment.—The purpose of this translation is to open the question of thyroid physiology in domestic animals which appears to require revision, particularly in the adult animal, where it seems to be incomparable to that of the human adult. Its pressor action on growth from weaning time through adolescence is well proved, but what part the thyroid plays thereafter is not clear, in fact, manifestly controversial. Perhaps too much ado has been made over the "iodine function" and too little over its cooperation with the endocrine chain in reproduction and metabolism through ingredients other than the much-lauded iodine of thyroxin.

* * * *

It Furnishes a Background

"Veterinary Military History of the United States" is an admirably written book which deserves a place in the library of every veterinarian. It furnishes a background for giving publicity to some phases of veterinary work concerning which the public has little knowledge. It will be a fine thing if this work is available for agriculturists, physicians and others interested in related sciences.

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Bactericidal Action of Bovine Blood and Serum Toward Brucella

The normal blood serum of cattle has a certain amount of microbicide action against *Br. abortus* as has whole blood.[39] The latter is, however, less bactericidal than the serum. Moreover, intensity of the action varies with the subjects. The serum of some animals is more active than that of others. Whole blood of cattle previously infected with *Br. abortus* is not as bactericidal as that of the normal. Whole blood of cattle has no bactericidal power over *Br. suis,* and the serum from these animals is more feeble against the porcine than the bovine strain.

Treatment of Canine Distemper With Serum of Adult Dogs

In a previous article the author[40] has described the method of preparation and use of a specific serum for canine distemper. After having noted that with rare exceptions, dogs raised by the furriers of Algeria were immune to the virus of the disease, he attempted to reënforce the immunity by inoculating them with a formolated vaccine prepared according to the technic of Lebailly. Bleedings were made 10 to 12 days following inoculation. It was not always possible to obtain young, susceptible dogs to furnish the necessary virus, nor was it convenient to install the special accommodations required to breed susceptible subjects. Having observed that the adult dogs of the Algerian furriers were nearly all immune to Carré's disease because of a previous infection, their serum was tested to determine whether it was sufficiently active for practical use. It was thought at first that it would be necessary to give larger doses to gain the same results as those obtained from a hyperimmune serum; but in later comparative experiments, no difference was observed in the use of more than 100 liters. To assure uniformity, the serum was made by mixing the serum of 50 or more dogs. The observations were confirmed by various colleagues.

As with all other sera, it was found to be especially efficacious if given during the first days of the disease, that is, before the body has been invaded by secondary organisms. It was also helpful as a supplement to the symptomatic treatment when the complications were recent.

Doses recommended are 3 to 5cc per kilogram of weight for large breeds and 5 to 8cc per kilogram of weight for the small breeds. It is preferable to start with large doses and reduce them later. When given during the two or three days preceding the appearance of pustules or other complications, the first injection is usually followed by rapid and marked amelioration. But no matter how effective the first dose, it is always advisable to repeat the injection after two to three days.

This "adult serum" has also been employed for preventive purposes in non-immunized subjects exposed at dog shows, on voyages or in infected kennels. The passive immunity thus conferred lasts two to three weeks.

The author emphasizes that serotherapy is far superior to chemotherapy in canine distemper and that breeders of dogs must understand that it is important that they have their subjects treated at the first signs of illness.

Chemotherapy in Trypanosomiasis

During the invasion of the body by trypanosomes or treponemas, the sugar level of the blood and the glycogen level of the liver decrease until only traces remain.[44] The lack of sugar in the blood causes a glycoprival intoxication, characterized by incoördination of movement, seizures of convulsions, delirium, sopor, and other symptoms. On the basis of this observation Schern experimented with sugar privation, using synthaline injections, in an effort to kill the trypanosomes and the treponemas. Syntheline doubles the fermentative and diastatic power of the amylase. Experiments with antikoman gave still better results, in that this preparation was not toxic; it can be given orally.

[39] Irwin, M. R., Beach, B. A., and Bell, F. N. *Journal of Infectious Diseases,* January-February, 1936.

[40] Plantureux, E. Traitement et prévention de la maladie de jeune age (maladie de Carré) par le sérum de chiens adultes. *Revue de Médecine Vétérinaire,* 89:1, (N. S. 1) June, 1937.

[44] Schern, K. 1937. Privation, a Form of Chemotherapy in the Fight Against Trypanosomiasis and Treponemiasis (Trans. Title). *Tierarrztl. Rundsch.* 43:675-678.

Displacement of the Eyeball in the Dog

Prolapsus bulbi oculi is of frequent occurrence in dogs, especially those belonging to the brachycephalic types. The causes for the condition are auto accidents and other traumas; occasionally injuries from the claws of a cat. The loose connection of the eyeball in the orbit rather favors its prolapse.

Reposition is brought about as follows: The eye and its surrounding structure are cleansed with a lukewarm solution of boric acid, and then anesthetized. Next, a cotton pledget dipped into boric acid solution is placed upon the prolapsed bulbus, and pressure is exerted. This usually reduces the edema of the lids. An assistant next attaches forceps to the lids and pulls them out as far as possible. Finally, by pressure upon the bulbus this organ slips into place. Lateral canthotomy may be necessary. In order to keep the bulbus in the orbit, the lids may have to be closed with sutures for two or three days.

Method of Drenching Sheep

It is known that very low concentrations of copper sulphate will produce the esophageal reflex in young sheep that are in good condition, but that up to a 10% solution is needed to produce the reflex in adult sheep that are in poor condition. The esophageal reflex is established immediately when the copper sulphate solution touches the pharyngeal mucosa in the case of sheep whose nervous reflexes are sufficiently active, but it may take a little longer in less sensitive animals so that the first gulp of the drench which is swallowed, may pass to the rumen before the reflex is established.

In drenching sheep with quantities[51] of 60cc it is observed that the bulk is usually taken in four to six gulps, which means that 10 to 15cc are swallowed at one time. If the total volume of the drench is 30cc (of a 3.4% sol.), ⅓ to ½ of it may go the wrong way. Mönnig, therefore recommends a dose of 60cc (of a 1.7% sol.) because the proportion actually lost would be smaller, and would make less difference to the total effect. In the case of very poor-conditioned adult animals the drench may be preceded by 2.5cc of a 10% copper sulphate solution.

Buffalo Gnat Plagues

Factors favorable for a gnat (*Simulium columbaczense*) invasion[52] are a low water-level, especially when caused by a uniform receding of the water and accompanied by a rise in temperature; a warm temperature of water and air; lack of strong winds and rains; clear sky and a high barometric pressure. Emerging of adult gnats may take place at a temperature as low as 12.5-13°C., but emergence in massive numbers requires higher temperatures. A gnat invasion usually develops as follows: On emergence the imagoes remain in the neighborhood of their breeding places, spreading out slowly; then they rise high up into the air, forming immense swarms. In their migrating flight they cover 100 to 260 kilometers until they finally settle down to attack man and animals (invasion).

The Problem of Trichinosis

The two parasitic worms which most certainly break through the barriers of modern sanitation are trichinae[53] and pinworms, two parasites, which still have received wholly inadequate attention in research and in medical practice. The federal meat inspection provides for such cooking, refrigeration, and processing as will destroy trichinae in meat products intended to be eaten without cooking. It does not provide for inspection of pork for trichinae, a procedure which would be very expensive and highly impracticable under high-speed American packing-house procedures; besides, only approximately 70% of the meat marketed in the United States is inspected. Outside of that inspection there is very little meat inspection by com-

[51] Preu, E. 1936. Prolapsus bulbi in the Dog. (Trans. Title.) Thesis. Vienna.
[51] Mönnig, H. O. 1937. On the toxicity of nicotine for sheep and the use of the nicotine-bluestone drench for worms in ruminants. *Rev. Med. Trop. y Parasitologia Bact., Clin. y Lab.* 3:3-10.

[52] Baranov, N. 1937. Observations from the simulium epidemic of 1936. *Veterinarski Arhiv* 7:229-276.
[53] Hall, M. C., and Collins, B. J. 1937. Studies on trichinosis. *Publ. Health Rep.* 52:468-490.

petent inspectors. A gap of approximately 30% in our meat inspection fence allows an ample supply of trichinae to drive through in pork products customarily eaten raw, and permits these most deadly of the parasitic worms to reach their destination in human hosts.

The findings brought out indicate correctly two striking facts: That the United States has the greatest problem in trichinosis of any country in the world; and that the problem is one of major importance, apparently affecting to some degree, at a conservative estimate, at least several million persons, with clinical trichinosis in some form affecting possibly several hundred thousand persons, and with possibly several thousand deaths. If the situation is even half as serious as it appears to be, then something in the way of organized and adequate action should be taken to fill the gaps in our existing knowledge by research, and to apply the known control measures to a much greater extent than they are applied at present.

It would be ill-considered to point out this problem without giving at least brief consideration to the known control measures for trichinosis. They may be summarized as follows:

1. Meat inspection of a quality equivalent to that of the federal meat inspection system should be extended to all meat produced in the United States, either by an extension of the federal inspection or by the development of equally sound systems under states, counties, or cities, to take care of the 30% of meat not inspected by federal forces.

2. The swine sanitation system, under which swine are protected against trichinae by being raised on clean forage crops away from garbage, swill, hog carcasses and offal, and rats, should be much more widely used by hog raisers. This system gives a large measure of protection from various swine diseases, and makes money for the farmer, not only by preventing disease, but by raising hogs to market weight months earlier than in the case of hogs raised under dirty hog-lot conditions, and hence at a great saving in time and feed.

3. Where hogs are fed on garbage or swill, it should be required by law that the garbage or swill be cooked to destroy trichinae, a procedure which is of great value also in preventing hog cholera and foot-and-mouth disease.

4. Rat destruction by trapping and poisoning, carried out by trained experts whenever possible, should be much more extensively utilized.

5. The campaign to educate the public against the use of any raw pork, or of any pork products customarily eaten uncooked that do not originate in establishments under federal inspection or an equivalent inspection, should be better organized and more intensive, since it is evident that the former idea that Germans and Italians constitute the preferred groups for trichinosis because of their food habits is no longer useful. It is only too evident that a large section of the American people as a whole has developed the habit of eating raw or improperly cooked pork and uninspected or inadequately inspected pork products. As evidence of this habit one may point to the eating of raw hamburgers, some of which contain pork as well as beef. Pork is a wholesome and desirable form of meat, and its use should not be handicapped by unsound methods of raising swine or improper methods of handling or cooking the meat.

6. Finally it is vital that sound research on trichinosis, from the basic biology of trichinae to the development of dependable diagnostic procedures, a sound and effective therapy, and a comprehensive epidemiology, be extended and expedited.

Fowl Paralysis, Lymphomatosis and Leucemia

The oral exposure of 188 birds,[54] 10 to 28 weeks of age, artificially and naturally parasitized to *Eimeria praecox, Eimeria necatrix, Eimeria maxima,* mixed coccidial infection, *Ascaridia, Taenia* and *Capillaria* and to *Salmonella aertrycke* resulted in fowl paralysis, leucemia or an allied condition

[54] Emmel, M. W. 1936. The Etiology of Fowl Paralysis, Leukemia and Allied Conditions in Animals. V and VI; Florida Agr. Exp. Sta. Bul. 305.

in 114 birds. Repeated oral exposure of 20 parasite-free 10 weeks old birds to *S. aertrycke* for periods of 30 and 90 days induced hemocytoblastosis but no other pathologic manifestation. The single oral exposure of young parasite-free chicks resulted in a few cases of fowl paralysis and leucemia. The ability of this causal microorganism to induce the pathologic manifestations in young parasite-free birds through the natural avenue of infection probably depends upon virulence. The incubation period for fowl paralysis was from 17 to 63 days, lymphomatosis 45 to 104 days, leucemia 73 to 172 days and "light" and anemia 14 to 18 days. Occasional cases occurred in which more than one pathologic manifestation developed. *S. aertrycke* is considered a cause of fowl paralysis, leucemia and allied conditions in the chicken.

Foreign Bodies in Dogs

To a group of 14 dogs 250 to 1350 ordinary pins were given to swallow, while another group of dogs was given 100 to 250 sewing needles.[55] The pins and needles ranged in length from 30 to 38 millimeters, and were imbedded in meat balls. The observation was made that no danger to life was produced thereby. In the intestines the pins and needles invariably arranged themselves in such a manner that the blunt end would always point in the direction of the anus. Three of the dogs which had ingested pins and all of the dogs which had ingested sewing needles exhibited a rise in temperature, and accelerated pulse and respiration. The lesions observed were stomatitis, an ulcerative gingivitis, and a catarrhal gastroenteritis with superficial ulcers, strictures and petechiae. In a few dogs sewing needles were found outside the gastrointestinal tract. All the pins and needles became partly dissolved in the stomach under the action of the gastric juices. When they were finally evacuated from the bowels, they were indistinguishable in the fecal mass.

[55] Natscheff, B. 1935. The effects on dogs following the swallowing of needles. (Transl. title) *Jahrb. d. vet. med. Fak. d. Univ. Sofia.*

Prontosil for Septic Conditions in Dogs

It has been shown that the blood of man and animals, following medication with prontosil,[56] can destroy hemolytic streptococci when applied *in vitro* tests. From these experiments it seems probable, therefore, that the bactericidal action which develops in the blood of prontosil-treated animals or patients is due to the presence of sulphonamide which is possibly produced from prontosil by the reduction of that substance in the body.

Prontosil

Owing to the economic and other limitations of work in connection with animals,[57] the isolation of the causal organism of various types of sepsis is usually out of question for the general practitioner. The value of prontosil in the treatment of infections in which a hemolytic streptococcus is likely to be involved, such as septic conditions of the genital and respiratory organs, would appear to justify the use of that agent. Whether this action will be equally valuable in the treatment of mixed infections, is of the greatest interest.

Pentothal Sodium Anesthesia in Dogs

Pentothal sodium anesthesia is of particular value for the performance of minor surgery in general practice.[58] The induction of anesthesia is quick and rapid. The duration of anesthesia is proportional to the rate of injection; for practical purposes it should never be completed in less than five minutes. The rate of recovery is also proportional to the rate of induction of anesthesia; recovery takes place quietly, and is usually complete in from two to three hours. In four hours the animal may be safely discharged from the clinic without the risk of a later call to reassure an apprehensive client.

[56] N. J. S. 1937. Prontosil. *Vet Rec.* 49:262-263.

[57] Whicher, A., and Smith, H. L. 1937. Some observations on the use of "prontosil in canine practice. *Vet. Rec.* 49:452-453.

[58] Sheppard, D. H. and Madeline. 1937. The use of pentothal sodium as a short-duration anesthetic in small animals. *Vet. Rec.* 49:424-425.